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VETERINARY MEDICINE

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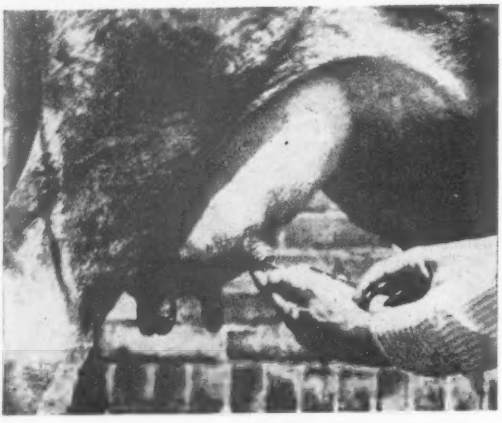
7632 S. Crandon Ave.
Chicago, U.S.A.

Treatment of Streptococcic Mastitis With Ty-Sin*

*(Combination of gramicidin and tyrocidin)

Extensive investigations by Little *et al.* (Rockefeller Foundation for Medical Research), Schalm (University of California), and Greenberg and Bryan (Michigan State College) have shown that the use of gramicidin is an effective, practical means of combating Mastitis due to *Streptococcus agalactiae*. Gramicidin (now designated as tyrothricin, which contains both gramicidin and tyrocidin) is an alcohol-soluble, water-insoluble substance isolated from cultures of an aerobic sporulating soil bacillus. Studies by the Jensen-Salsbery Laboratories have resulted in the development of Ty-Sin, an aqueous alcoholic suspension of tyrothricin (gramicidin and tyrocidin). The active principles are released only from an aqueous medium. Each 20 c.c. of Ty-Sin contains 40 mg. of tyrothricin.



Use of Ty-Sin

Lactating cows — After thorough stripping of the quarter, 40 c.c. of Ty-Sin, which constitutes an average dose, is injected into the milk cistern via the teat canal, under strict aseptic conditions. The quarter is massaged vigorously to disperse the material, and is milked out at the next regular milking. Treatment may be repeated in seven to ten days as indicated.

Dry Cows—One 40-c.c. dose is injected as above, except that the material is left in the quarter. Only one injection is given.

Reactions

In some cases the milk for one to three days may be clabbered, flaky, or stringy. Gross changes in the milk resulting from the treatment usually disappear by the end of the third day. In general, influence on quantity of milk secreted is less than 1 per cent.

Contraindications

Quarters manifesting acute inflammation or marked fibrosis or atrophy should not be treated. It is satisfactory to treat cases showing acute flare-ups after evidence of the inflammation has subsided.

Mastitis Control

In brief, control of Mastitis revolves about the early detection of infected cows, segregation of these animals, precautionary measures to prevent spread of the infection to other susceptible animals in the herd, and the use of Ty-Sin. Physical examination of the udder, use of the thybromol test, direct microscopic examination of stained milk smears, and bacteriological examination of properly collected milk samples are important steps in detecting the infection and appraising the results of treatment with Ty-Sin.

Results

Published data on the use of gramicidin indicate an efficiency of approximately 76 per cent in ridding infected quarters of *S. agalactiae*, which is responsible for over 90 per cent of Mastitis cases today. Controlled studies with Ty-Sin under the same field conditions confronting the practicing veterinarian have demonstrated the like efficiency of this product. On the basis of reactions to the treatments and effectiveness, Ty-Sin is definitely superior to colloidal silver oxide.

Our Laboratories offer Ty-Sin in 250-c.c. vials at $3.25, less discounts of 10 and 2 per cent.

(Write for Literature)

JENSEN-SALSBERY LABORATORIES, INC.

Kansas City, Missouri

VETERINARY MEDICINE

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Leading Publication in the Veterinary Field for More Than Thirty Years

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Acute ulcerative stomatitis caused by organisms other than Vincent's may be associated with deficiency of nicotinic acid.

Veterinary medicine is as important, as vital to civilization and progress as is food, for it holds the only adequate assurance of a sufficient food supply.

Only by preparing for a long war can we make certain it will be ended in the shortest possible time. Anything less would be a fatal mistake.—*Roger Babson*

When the American Veterinary Medical Association was born during the dark days of 1863, one of the declared objects was to aid the government in the prosecution of the war. The Army of the Potomac required 500 fresh horses daily to replace its losses and the armies in the west needed 150 each day. Much of this loss was due to glanders which was spread to the horses of the civilian population. These veterinarians believed that the loss of animals and the spread of disease could be reduced greatly, and in June of the year of 1863 they were organized for that purpose. Thus the first national veterinary organization in this country had its genesis in war.

Man, monkey and guinea pig must secure their vitamin C from plants; other animals can make it for themselves. This vitamin is a characteristic constituent of plants during growth but not during dormancy. If a seed is sprouted vitamin C appears overnight.

After ten years of experimental tests with mice, rabbits and monkeys, Dr. Robert G. Green, bacteriologist at the University of Minnesota, reports that certain animal cancers are the result of virus infections. He contends that human pre-cancerous growth transmitted during his tests to monkeys gave strong evidence that cancer in man develops from pre-cancerous growths caused by viruses.

Today the need for conservation of health and physical fitness is greater than at any time in the nation's history. . . . The total defense that we have heard so much about of late, that total defense which this nation seeks, involves a good deal more than building airplanes, ships, guns and bombs. . . . We cannot be a strong nation unless we are a healthy nation. And so we must recruit not only men and materials, but also knowledge and scienee in the service of national strength.—*F. D. Roosevelt.*

Among the canned products most widely used in the Army are corned beef, corned beef hash, dried beef, bacon, ham, and a variety of sausages. All are inspected at purchase and again when issued to the troops by officers of the Veterinary Corps.

★ ★ ★ Buy Defense Stamps and Bonds

It has been found at the Michigan Agricultural Experiment Station that heat-treated soy bean meal (expeller and roasted solvent) is more palatable and more efficiently utilized than raw solvent meal, producing practically as good gains as tankage fed with corn, barley and alfalfa.

Vitamin C Used in Mexican War

Ulysses Grant first distinguished himself in the Mexican war by feeding vitamin C to soldiers who lay sick with scurvy. The soldiers got well and we got Texas. Lemons were the source of Grant's vitamin C. There are many other sources of this ingredient, prominently the other citrus fruits and fresh vegetables. Scurvy isn't the only possible consequence of a vitamin C deficiency. In the Virgin Islands the birth rate was low until the United States government introduced tomatoes as a commercial product. The addition of vitamin C to the islanders' diet was followed by a substantial increase in the birth rate.

Iron for Blood Donors

It has been found that the hemoglobin regeneration of blood donors takes place eight times more rapidly when iron has been given. The best time to administer the iron is during a period preceding the blood loss. The return to the previous level was complete in an average of 11 days after a 500cc donation of blood under iron therapy. Ordinarily a far longer period is required. Professional blood donors were used in the tests and the conclusion reached was that the diet of regular donors should be supplemented with iron. Because of its convenience and freedom from reaction, ferrous sulphate is regarded as a satisfactory form of iron for this purpose.—*Jnl. Lab. & Clin. Med.*

Dicoumarin, the substance in spoiled sweet clover which causes sweet clover disease in cattle, is now being used to prevent thrombi and emboli in post-operative cases. It may be given by mouth. It is more effective and cheaper than heparin, which has been most recently used for this purpose.

Prevent Contamination in Stored Liquid Blood Plasma

The sulfonamides, particularly sodium sulfathiazole, have been found highly successful as bacteriostatic and bactericidal agents to insure preservation, without contamination, of fluid blood plasma. The quantity of drug needed is small and the plasma is kept pure and usable over a wide range of temperature (40° to 70° F.) and for long periods of time. Sulfonamides may be used in conjunction with any of the methods of processing liquid plasma now available.

X-Ray Films the Property of the Veterinarian

It is a matter of common knowledge that x-ray negatives are practically meaningless to the ordinary layman, but their retention by the physician, surgeon or veterinarian constitutes an important part of his clinical record in the particular case, and in the aggregate these negatives may embody and preserve much of value incident to his experience.

X-ray negatives are as much a part of the history of the case as any other record. In a sense they differ little, if at all, from microscope slides of tissue made in the course of diagnosis or treatment. It would hardly be claimed that such slides are the property of the client. Furthermore, in the event of a malpractice suit the x-ray negatives, which he has caused to be taken and preserved, incident to treatment, might constitute unimpeachable evidence which would fully justify the treatment of which the client was complaining. To put it another way, the client pays for the diagnosis, not for the means by which it is made, although obviously the expense of such means constitutes a part of the charge against him.

What, No Traumatic Pericarditis!

The stomach of a tiger shark was found to contain 7 leggings, 47 buttons, 3 leather belts and 9 shoes.

Sulfanilamide Beneficial in Fowl Pneumonia

Sulfanilamide, conqueror of a score or more of human diseases, appears to be good also for some of the diseases that afflict the poultry yard. It has been used successfully in treatment of fowl pneumonia and some types of eye infection by D. E. Lothamer of Louisville, Ohio. In most cases, the treated birds had fully recovered within 24 hours, with no unfavorable after-effects.—*S. N. L.*

Conquering Gas Gangrene

Sarah E. Stewart, Bethesda, Md., has announced the development of a toxoid that has proved to be effective in immunizing guinea pigs against the commonest of the three types of organisms generally involved in gas gangrene, *Cl. perfringens*.

Sulfanilamide or one of its derivatives has been found by G. B. Reed and J. H. Orr, Kingston, Ont., to control experimental gas gangrene in guinea pigs. The results appear to demonstrate that sulfanilamide and its derivatives, especially sulfathiazole, have a marked retarding effect when introduced early into infected wounds.

New Insect Vectors for Bubonic Plague

Isolation of virulent plague bacilli, from avian fleas has been reported by Wheeler, Douglas and Evans[1] of the Hooper Foundation, San Francisco. A mass inoculation of fleas from a burrowing owl into a guinea pig proved that they were carriers of virulent plague bacilli. This is apparently the first definite proof of avian transmission of plague infected insects. As far as known, the birds themselves are not susceptible to the plague bacillus. The association of burrowing owls with colonies of ground squirrels, however, is epidemiologically interesting.

[1] Wheeler, C. M., J. R. Douglas and F. C. Evans, 1941. *Science* 94, p. 560.

Possible Danger in Use of Sulfaguanidine

According to scientists of John Hopkins University School of Hygiene, sulfaguanidine, which is used in treating dysentery and similar ailments, causes goiter in rats.

A New Treatment for Burns—Hydrosulphosol

This sulphur compound (no kin to the sulfonamides) has been found extremely effective* in burns caused by steam, hot metal, hot oil, lime and gasoline. The drug is mixed with water and sprayed upon the burned surface every 20 to 30 minutes until a tough scab is built up. The application of this spray not only relieves pain but prevents infection. It forms a flexible crust over the eschar so that motion does not dislodge it.

Use of Vitamin A in Stock Feed Restricted

Livestock feeds are facing an immediate, temporary shortage of vitamin A, but many manufacturers can reduce the amount of this vitamin in their feeds far below present levels and still provide sufficient vitamin A for good nutrition. The War Production Board has prohibited the use of high potency vitamin A fish and fish liver oils and restricted use of low potency fish sources of this vitamin in livestock feeds because the war has cut off some of our supplies, and because England needs large quantities of vitamin A concentrate for human consumption.

It is estimated that approximately half the commercial feeds on the market contain at least 50% more vitamin A than the minimum required for good nutrition. The present shortage, which is likely to continue until a part of this year's alfalfa crop can be harvested and made into meal, can be offset if manufacturers make vitamin A supplies on hand go as far as possible by using only as much in their feeds as is needed for good nutrition.

★ ★ ★ Buy Defense Stamps and Bonds

*Robertson Mellon in *Industrial Medicine*.

Veterinarians Selected by the Board of the Procurement and Assignment Service

The following veterinarians have been assigned by the President's Board for the Procurement and Assignment Service for Physicians, Dentists and Veterinarians, to serve on their respective corps area or state committees of the Board.

FIRST CORPS AREA.—R. W. Smith, State House, Concord, N. H.
Maine: P. R. Baird, 52 Pleasant St., Waterville.
New Hampshire: R. W. Smith, State House, Concord.
Vermont: A. A. Mortimer, 27 Central St., Randolph.
Massachusetts: Harrie W. Pierce, 100 Nashua St., Boston.
Rhode Island: J. S. Barber, 560 Pleasant St., Pawtucket.
Connecticut: Edwin Laitenen, 993 N. Main St., West Hartford.

SECOND CORPS AREA.—R. R. Birch, Route 2, Ithaca, New York.
New York: Albert L. Brown, Route 1, Adams.
New Jersey: A. W. Smith, 8 Longview Road, Livingston.
Delaware: Harry McDaniel, Jr., State Board of Agriculture, Dover.

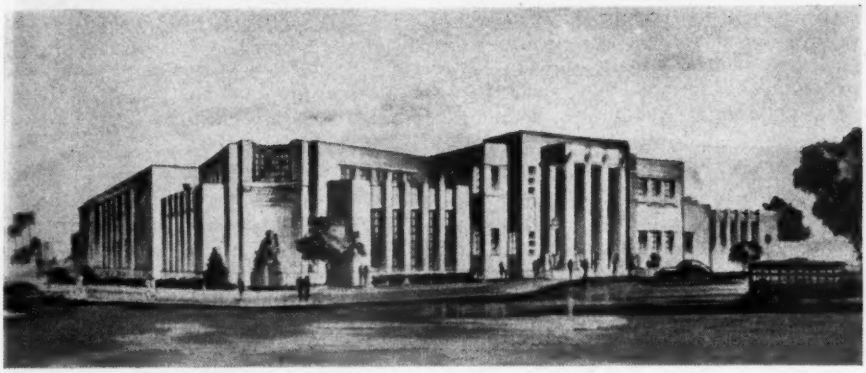
THIRD CORPS AREA.—Mark Welsh, College Park, Maryland.
Pennsylvania: Ernest W. Hogg, 20 Darling St., Wilkes-Barre.
Maryland: A. L. Brueckner, College Park.
Virginia: I. D. Wilson, Virginia Polytechnic Institute, Blacksburg.
District of Columbia: A. E. Wight, B.A.I., Washington, D. C.

FOURTH CORPS AREA.—B. T. Simms, Reg. Animal Disease Research Lab., Auburn, Ala.
Tennessee: M. Jacob, University of Tennessee, Knoxville.
North Carolina: William Moore, Department of Agriculture, Raleigh.
South Carolina: R. A. Mays, J. C. Calhoun State Office Bldg., Columbia.
Mississippi: E. S. Brashier, Miss. State Live Stock Sanitary Bd., Jackson.
Lousiana: E. P. Flower, Box 24, Baton Rouge.
Florida: J. L. Ruble, 1600 N. Orange Ave., Orlando.
Georgia: J. M. Sutton, Sylvester.
Alabama: R. S. Sugg, Alabama Polytechnic Institute, Auburn.

FIFTH CORPS AREA.—A. F. Schalk, Ohio State University, Columbus, O.
Indiana: Charles C. Dobson, New Augusta.
Kentucky: Arthur J. Kay, 517 Murray St., Frankfort.
Ohio: D. C. Hyde, 1700 Arlington Ave., Columbus.
West Virginia: H. M. Newton, P. O. Box 1721, Charleston.

SIXTH CORPS AREA.—Ward Giltner, Mich. State College, East Lansing, Mich.
Illinois: A. E. Bott, 1317 Pennsylvania Ave., East St. Louis.
Michigan: B. J. Killham, Mich. State College, East Lansing.
Wisconsin: W. Wisnicky, University of Wisconsin, Madison.

SEVENTH CORPS AREA.—H. D. Bergman, Iowa State College, Ames, Iowa.
Kansas: R. R. Dykstra, Kansas State College, Manhattan.
Minnesota: C. E. Cotton, 3145 Portland Ave., Minneapolis.
Arkansas: Joe S. Campbell, Route 4, Little Rock.
Iowa: A. R. Menary, 1721 Blake Blvd., Cedar Rapids.
Missouri: S. W. Haigler, 7645 Delmar Ave., St. Louis.
Nebraska: W. T. Spencer, Livestock Exchange Bldg., Omaha.
North Dakota: R. E. Shigley, 710 2nd St. S.E., Minot.
South Dakota: D. L. Cotton, Beresford.
Wyoming: H. D. Port, 304 Capital Bldg., Cheyenne.



THE NEW BUILDING OF THE COLLEGE OF VETERINARY MEDICINE OF THE UNIVERSITY OF HAVANA
The Nutritional Laboratory in this splendid new building is called the Mayo Laboratory in honor of Nelson S. Mayo, well known American veterinarian, who was formerly in the service of the Cuban Government in a capacity corresponding to that of Chief of the Bureau of Animal Industry in this country

EIGHTH CORPS AREA.—M. B. Starnes, City Health Dept., Dallas, Texas.

Arizona: T. B. Jones, 105 Capital Bldg., Phoenix.

Colorado: Floyd Cross, Colorado State College, Fort Collins.

New Mexico: S. W. Wiest, Box 75, Santa Fe.

Oklahoma: L. J. Allen, 1610 North Ellison, Oklahoma City.

Texas: T. O. Booth, 2002 W. T. Waggoner Bldg., Fort Worth.

NINTH CORPS AREA.—C. M. Haring, University of Cal., Berkeley, Cal.

Idaho: Arthur P. Schneider, 2519 Boise Ave., Boise.

Montana: W. J. Butler, Capitol Station, Helena.

Nevada: Edward Records, University of Nevada, Reno.

Oregon: Fred W. Lange, 855 Belmont St., Salem.

Utah: W. H. Hendricks, 1419 East 17th South St., Salt Lake City.

Washington: M. O. Barnes, 203 Federal Bldg., Olympia.

California: Joseph M. Arburua, 26 Fell St., San Francisco.

The United States Army and Navy do not permit the commissioning of women veterinarians. However, all should enroll with The Procurement and Assignment Service.

Freezing for Amputation

New York City's Welfare Hospital reports that the death rate from gangrenous amputations has been reduced from 83 to 18%, by the use of extremely low temperatures.

In preparing for amputation the flow of blood is cut off by a tourniquet, the limb is anesthetized by a refrigerating coil to just above freezing, then it is amputated. This low temperature reduces post-operative infection.

* * * *

Extensive Production of Typhoid Vaccine

Typhoid vaccine was first introduced into the Army in 1909, but less than 1000 of the personnel were vaccinated that year. The voluntary system continued until September, 1911, at which time, because of its proved value, it was made compulsory in the army and has been used extensively since then.

During the past fiscal year the Army Medical school prepared, principally for use of the armed forces, 24 million doses of typhoid vaccine. Facilities of the laboratories of this school have been increased to such an extent that the production is expected to be 500,000 three-injection treatments per week—or 78 million doses for the year.

Dog Food Testing Program Suffers Reverses

THE dog food testing program that a handful of selfish members foisted on the A. V. M. A. at the Memphis meeting has become a harmful venture for the association. It was put over in a "blitzkreig," by misrepresentation and fraud. This was told in these pages soon afterward, and to this day, none has come forward to deny it. The reason: page and paragraph were given where the untrue statements were published in the official journal.

To recount only three of the misstatements (there were more, but these illustrate the methods used):

1. The House of Representatives was told that the cost of a seal was $500 and that this sum was paid directly by the dog food manufacturer to the University of Illinois for making the test. The truth is, the charge was $950 a year and the money was all paid to the dog food committee of the American Animal Hospital Association; the University of Illinois received but $100 of that amount for the test.

2. The House of Representatives was told that the University of Illinois sponsored the test. The University of Illinois flatly denied this.

3. The A. V. M. A. was told that the dog food testing project would not cost it anything. Experience has proved otherwise. It has been expensive in good will, prestige, money, and lost opportunities.

Fundamental faults of the program have been pointed out in detail in these pages.[1] It is true a number of them have been corrected in the past two years as a result of this exposure. The A. V. M. A. has been given representation on the dog food committee. The false and misleading—one must say, disgraceful—advertising that appeared during the first year after Memphis has been discontinued. The flamboyant sales campaign to dispose of seals as a mail-order business has been replaced by more subtle methods.

Any changes that limit the income from the distribution of seals; or that would bring the fees into the A. V. M. A. treasury, where the members could have an accounting of it, have been successfully resisted.

Government meat inspection is not recognized by the dog food committee. To have limited seal holders to those using only B. A. I. inspected meat in their foods, would have eliminated from consideration many of the cheap, inferior canned foods and thus narrowed the field for the disposal of seals. In other words, the B. A. I. inspection is intentionally avoided in order to increase the number of prospective seal buyers. Establishing a minimum standard of quality that dog foods must attain before they would be approved would have had the same effect and was not done.

Every other legitimate Seal of Approval project in the United States awards seals on merit alone and at no cost to the recipient. Such a method was not even considered by the originators of this plan because the whole program was conceived primarily for the purpose of making money for the promoters. For this reason a price was set on the seal of approval; a price far in excess of any contemplated cost of the test. For no other reason was a sales campaign launched which included the name of every ascertainable dog food manufacturer. It was well known that not more than a dozen or so of the 200 commercial dog foods on the market contained sufficient of the necessary food nutrients.

It was said in the beginning that the dog food testing program would be harmful to the A. V. M. A. Not all the circumstances to substantiate this can be told at this time; for the present some of the information is confidential. But various matters are obvious; the project has caused dissension and contention among the membership and has occupied the attention of the officials of the association at the expense of other matters of much concern to a majority of the members. One result of this is, the gain in members has slowed down; in contrast, during World War I, the A. V. M. A. experienced a growth in membership unapproached in rapidity before or since.

[1] *Vet. Med.* 35:6 (June, 1940), pp. 323-325; 35:7 (July, 1940), pp. 374-376; 35:8 (August, 1940), pp. 425-426; 35:9 (September, 1940), pp. 482-485; 36:6 (June, 1941), pp. 294-295; 36:7 (July, 1941), pp. 344-345; 36:8 (August, 1941), pp. 397-398.

In the present war, when the government has been bending every effort to increase livestock production, it has found the officials of the A. V. M. A. head over heels in a matter entirely foreign to human food production. No representative of the veterinary profession is included on the board appointed by the President to administer the Procurement and Assignment Service for Physicians, Dentists and Veterinarians for National Defense. The fate of the veterinarians in this respect is in the hands of physicians and dentists, with veterinarians on subcommittees only.

We have said that the program has been costly in money as well as in lost opportunities. Many committee and conference meetings have been held with the expenses of the members and conferees paid out of the A. V. M. A. treasury.

Little control has been exercised by the association over the advertising of seal holders, and some of them have used the seal in unfair and misleading advertisements. This most surely will result in an investigation of the association by the federal government.

Is this one project worth such a price?

★ ★ ★ Buy Defense Stamps and Bonds

Veterinary Practice Acts Protect the Livestock Owner

Even the most casual investigation reveals that most veterinary practitioners are not satisfied with the veterinary laws under which they operate. Most of the state veterinary practice laws were enacted in the period from 1895 to 1910. Few of them have been materially improved by amendments since that time. It is therefore not surprising that each biennium, when the state legislatures meet, veterinary practice acts come up for discussion in a number of them.

The primary, one may say the sole purpose, of a veterinary practice act is to protect the livestock industry of the state. Its aim is to keep the livestock owners from being imposed upon and suffering loss from the ministrations of persons who are not qualified to handle livestock disease. Naturally, such laws usually operate to the advantage of competent veterinarians in that, if enforced, they will relieve such practitioners of the competition of the incompetent—a type of competition prone to be unscrupulous and destructive. Veterinarians seeking legislation should never lose sight of the fact that this latter effect is purely incidental and not an objective of veterinary practice laws. Some have viewed veterinary legislation as an attempt to protect or favor qualified veterinarians and their experience with legislatures has not been a happy one.

* * * *

The importance of a good veterinary service to a people is clearly exemplified in modern times by the experience of Russia. Following the Revolution, Soviet Russia destroyed its veterinary service. That act was followed promptly by the most disastrous famine in any western country in a century. In 1938 the U.S.S.R. had established the most elaborate veterinary service in the world, and there were as many students in its veterinary colleges as in all the rest of the world combined.

* * * *

Scientific Veterinary Medicine Established for Military Reasons

It is common observation that the animals of great districts cannot be promiscuously intermingled without the outbreak of devastating epizootics, such as occurred on the occasion of every war in the seventeenth century and earlier. History tells us that for a thousand years every nation that waged war against the peoples of southeastern Europe and the steppes of Asia suffered far greater losses from the ravages of rinderpest than they did from the arms of the enemy. It was to conserve the animals and in that way assure food for the armies of France, Austria, Germany, and other countries of western continental Europe that they established veterinary colleges. Thus there was a military reason back of the founding of the veterinary educational system of modern times, just as there has been a military reason for the majority of changes that have come about in that educational system.

"Plague on Us"*

The struggle for existence is a circus with more rings than Barnum and Bailey could have dreamed of.

Quarantine is a gallant effort, against considerable odds, to limit the prevalence of some diseases geographically.

It has taken 20 years of education and legislation, sweetened by bounties for slaughtered animals, to bring the United States to the point where it is virtually free of bovine tuberculosis.

Men worked in the dark. Real progress began when they learned to pluck the disease principle out of the body and watch it by itself . . . when disease could be caused at will in laboratory animals the way was open for an endless series of clarifying deductions.

We are no longer dependent on Asia for plague; we have our own reservoir, a vast and probably a permanent one. We cannot wipe out the ground squirrels and their susceptible relatives in the great open spaces. It is possible . . . to keep the squirrels away from the immediate vicinity of a city, and to exercise some control over the squirrel population in and about recreation areas by periodic poisoning.

The mechanism of animal infection may not be too simple. Shope has found reason to believe that the virus of swine influenza (which needs the co-partnership of the influenza bacillus to make the pig sick, but must have some place to stay when not making the pig sick) lives in a lungworm that lives in the pig's lungs after it has first lived in an earthworm that the pig eats. It sounds like the house that Jack built only crazier.

Against a broader biological background, epidemics take their place as by-products of the universal struggle for existence.

It takes two to make a communicable disease, one to give and one to take. In an epidemic . . . there must be many takers for each giver.

Virulence and "infectivity" do not necessarily go together; . . . some strains of bacteria tend "to spread but not to kill," others "to kill but not to spread."

The influenza pandemic of 1918-19 ranks with the plague of Justinian and the Black Death as one of the three most destructive outbreaks of disease that the human race has known.

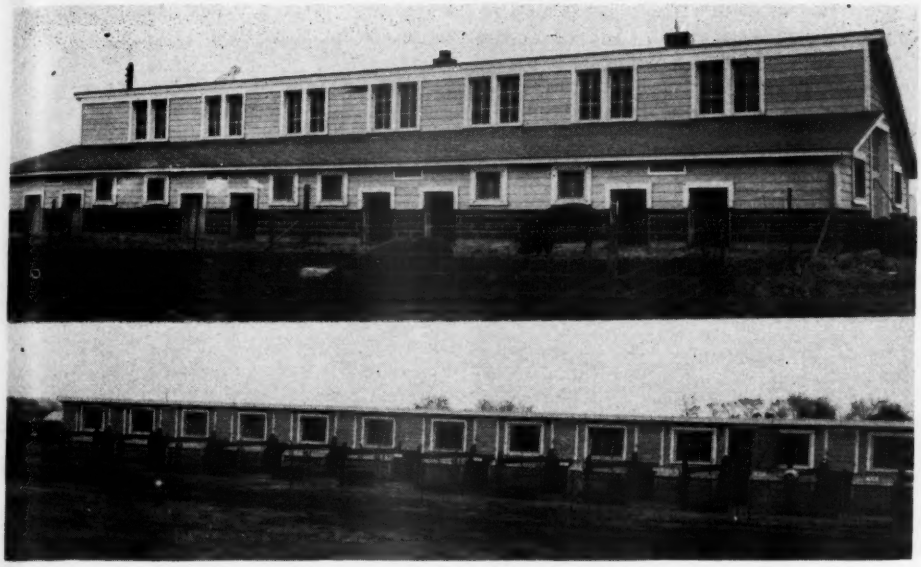
It makes a great difference, of course, whether few or many bacilli attack a given host, but much seems to depend in tuberculosis—perhaps more than in other diseases —on the amount of generalized resistance the host can muster.

Progress in the understanding and control of acute communicable diseases has come about through lifting them, one by one, out of the class of inexplicable or merely environmental phenomena into a class caused by the passage of specific living invaders from one body to another.

Robert Koch . . . in 1875 . . . grew the anthrax organism . . . he watched the tiny rods lengthen and, under certain circumstances, bead out into spores which presently left the parent stalks. Under suitable conditions, again, he saw them develop once more into rods. Whether spores or rods were present, the culture carried death to the frogs, mice and rabbits which he inoculated. For the first time in history the whole life cycle of an organism known to produce a given disease had been observed and recorded.

*_Plague on Us_ by Geddes Smith, cloth bound, 365 pages, illustrated. Published by The Commonwealth Fund, New York. Price $3.00. _Vide_ review in the October, 1941, issue of VETERINARY MEDICINE, page 535. It is a graphic account of the struggle of mankind through 20 centuries to understand and forestall pestilences. It sums up what is known and points out how much is unknown about epidemics—a biological drama dealing with man as the stuff out of which plagues are made.

A Swine-Breeding Research Farm



Above: New half-monitor farrowing house with some Poland-China gilts soon to farrow, at the U. S. Department of Agriculture regional swine-breeding research farm, Ames, Iowa. Three similar half-monitor houses are included in the unit of which this is a part. Below: Record of performance house and pens at the regional swine-breeding research farm

The swine-breeding research farm at the Iowa agricultural experiment station is located about five miles southwest of the Iowa State College campus at Ames. Experimental pigs were first placed on the farm in the summer of 1938. It is now fully stocked.

■ The farm and the fences and permanent buildings are the property of the Iowa Agricultural Experiment Station. The experimental work is a part of the research work of the "Regional Laboratory for the Improvement of Swine by Breeding" established in 1937 for cooperative research between the United States Department of Agriculture and the state agricultural experiment stations in the north central states. A considerable portion of the equipment and general expense of operation is provided from federal funds appropriated by Congress to the United States Department of Agriculture under the Bankhead-Jones Act.

■ This is an experimental farm and its buildings, fences, etc., are arranged primarily to be suitable and convenient for acquiring new knowledge useful in swine production. It is intended that good and economical practices will be followed, so far as the main purposes of the experiments will permit. But it is sometimes necessary in these experiments to do things which would not be economical on a commercial farm. For example, a larger number of boars must be kept in order to develop and maintain many lines which are completely distinct from each other. Many records and in far greater detail are kept than would be practical on the usual farm.

■ Simpler, more accurate and more complete yardsticks, as impersonal as possible, are being sought to supplement or replace those now available for measuring the practical usefulness of each pig. These are used primarily to guide in selecting individual

Four purebred Danish Landrace hogs in a pen at the record of performance house

animals and to compare different families or strains and crosses between them.

For pigs at market age, such standards are based mainly on their rate of gain and on how well their conformation, finish and quality comply with market standards. Credits for rate of gain are modified by data on economy of gain and credits for conformity to market standards are modified by the merit of the carcasses of the pigs butchered.

Measures of credit for sows must also include something about their fertility and nursing ability, as measured by the number of pigs which they produce and by weight of the litters which they bring to weaning time. The conformation and growth rates of the sow's pigs are the basis of a progeny test of the sow. Progeny tests are also used in rating boars which are yearlings or older.

At the present the most promising components for such "yardsticks of merit" seem to be: (1) Weight at 180 days (2) a score or grade for conformity to market standards when weighing about 225 pounds and (3) number of pigs and weight of the litter at weaning time. Attention is also being given to number and weight of the pigs at birth and at three weeks (before they eat much except their dam's milk). Four sample pigs from each of as many litters as can be managed are being fed in separate pens so that the litters which produce a pound of gain most economically can be identified. These sample pigs are slaughtered when they reach 225 pounds, so that the merits or defects of their carcasses can be seen and measured.

■ More knowledge is needed about the usefulness of different breeding systems, particularly about what will happen when various intensities of inbreeding are accompanied by selection as intense as possible. The intensities of inbreeding now being studied are on three levels representing what happens in closed herds where no outside blood is ever introduced. In the herds with the most intense level of inbreeding only one sire is used each season. At the intermediate level, two sires are used in each season, and in the least intensely inbred herd, four sires.

The four-sire herd was first established in 1930 and no blood has been added to it since then. The one-sire and two-sire herds were first started in the fall of 1937 with animals taken from the four-sire herd.

■ A fairly accurate, complete and simple yardstick for measuring the practical usefulness of a pig would be helpful to all producers of hogs, either for market or for breeding purposes.

More knowledge about breeding methods, particularly knowledge leading to enough control over inbreeding that its power for good can be utilized without also paying the full penalty of its power for bad, would be useful to all.

The inquiry into breeding methods is aimed largely at finding how far swine breeding can follow in the road which the corn breeders have taken and which has resulted in the well-known hybrid seed corn. It is certain from the nature of the material that swine breeding cannot follow this road exactly, but it may be able to go some

distance in that direction. Suitably modified methods might be able to increase materially the economy and efficiency of swine production.

Purebred Danish Landrace swine nearing market weight in one of the record of performance pens

■ Only one breed (the Poland-China) is used for the main part of these studies although 11 breeds are used in the experiment. One breed is used so that the comparisons between the different breeding systems can be more clearly interpreted with less risk of being misled by breed differences. The main object is to find new principles and applications which breeders can use in their own herds. New principles useful in improving one breed of swine should be nearly equally useful in all other breeds and this is being checked with the ten other breeds included in the experiment. The Poland-China was chosen here because it is an important breed in Iowa and also because the experimental herd at the Station in 1930 when the initial exploratory work on this project began was already composed of high grade Poland-Chinas with which the animals of the new project could be compared directly.

■ A few purebred Danish Landrace are kept to furnish information on their performance in this country under Iowa conditions. They are totally unrelated to our native breeds having been developed under Danish conditions to a high level for production of bacon well suited to the demands of the British market. Feeds and conditions of management differ widely from the Danish and at the moment the object is primarily to learn to what extent, if any, the special performance of the Landrace pigs in Denmark depends on the way they are fed and managed and to what extent it depends on their heredity being different from that of American breeds. In Denmark barley is the principal grain in the swine ration and skimmed milk the chief protein supplement. For economic reasons, in this country we must use principally corn for the grain ration and a variety of protein feeds. Various Poland-China-Landrace crosses are also being studied.

Swine abortion has proved a difficult problem on this experimental farm, principally because many of the sows affected are indispensable genetically and must be retained in the herd. They usually recover and become breeders again, but in the meantime, spread the infection to others. Through isolation and other sanitary measures the infection has been held at a tolerable level and hopes for its complete elimination are held.

* * * *

For fall pigs, which do not show much vigor, protein in the form of tankage is advisable, according to M. G. Zavoral, Minnesota Animal Husbandryman. Soybean oil meal is good but a combination of animal and plant protein is better. This should be composed of equal parts of soybean oil meal and tankage. Skimmilk and leafy green alfalfa make a good combination also.

* * * *

We must consider the state of nutrition of the herd to be vaccinated. Pigs raised on clean ground and fed a well balanced ration are less apt to fail in response to serum than hogs fed an unbalanced ration, for their health is normal, their resistance at its maximum and if any unrecognized complicating infection is present they are in better condition to withstand it during the reaction or leucopenia state subsequent to the serum-virus vaccination.—*Benj. Rosenfeld.*

Veterinary Science on the Range

By JAMES W. BENNER
New Mexico College of Agriculture and Mechanic Arts
State College, New Mexico

STATE COLLEGE, New Mexico, is close to Mesilla Park and to Las Cruces, about 45 miles northwest of El Paso, Texas. The climate here is semi-mild, with practically no snow in the winter except on the mountains. It is slightly windy in the spring, and there is about eight to ten inches of annual rainfall, most of which usually falls during July and August. The valley of the Rio Grande, in which we live, has an elevation of about 3,800 feet.

Many localities in New Mexico have no professional veterinary service available. A good veterinarian could not maintain a satisfactory standard of living for himself and his family in such districts because of the sparse human and animal population. The distances are great and mileage alone, to say nothing of time and material consumed, would necessitate prohibitive fees. Such conditions must be borne seriously in mind in executing the duties of veterinarian of a state educational institution. Information on animal disease problems is dispensed freely to those who request it. Owners of livestock, county extension agents, and vocational agricultural teachers cannot do many things pertaining to veterinary work because of lack of knowledge, training and proper equipment; but they are often compelled to do the best they can with what they have at hand. Some consultation and help under these circumstances are gladly given and seem to be appreciated.

LUNCH TIME ON THE DESERT

On the lar side of Franklin Mountain (background) nestles the New Mexico A. & M. College, where the author is a professor. The vegetation in the foreground, salt bush and cactus, is typical of this section of the desert. The vehicle is a "Kitchen Truck," the soldiers part of the personnel of the 30th Veterinary General Hospital, the time 12:00 noon

The duties of the veterinarian at the New Mexico College of Agriculture and Mechanic Arts are diversified. He serves as veterinarian for the college livestock, teacher of animal anatomy and physiology, diseases and sanitation, and part-time assistant in extension animal husbandry. He is a member of the experiment station staff. The observations from which these "impressions" have been obtained are all limited to activities pertaining to the institutional duties enumerated, since nearby Las Cruces, unlike many sections of the state, is fortunate in being served by a very capable veterinary practitioner and gentleman, Dr. H. C. Schipman.

Of course, this by no means measures up to a professional veterinary service, but it is better than nothing—and that is the alternative.

■ The work of the veterinarian for the college livestock consists of treating colic in horses, mostly of the chronic-indigestion type, routine vaccination against distemper and equine encephalomyelitis, castrations, and occasional obstetrical work. The few horses raised and worked by the animal husbandry department of this college are fairly well kept. In general, however, in my estimation work horses in the state are not well managed. Too often they are worked from the range and the hay rack with little grain. Too much alfalfa hay, of a poor to medium grade, is fed, and by the time a horse is eight to ten years of age he is almost sure to have poor wind, if not a well-developed case of heaves. If one goes around the barn or corral where these horses are kept, one hears a great deal of coughing accompanied by other well-known sounds. Not so long ago I destroyed a horse which had become so heavey he could no longer be worked. When a few of the ribs were removed at necropsy, the lungs, instead of collapsing, bulged through the opening. Pulmonary emphysema—you tell 'em! This horse's lungs, pale, soft and spongy, had entirely lost their power of elastic recoil. Work horses receive little, if any, grooming, and many times they are worked with poorly fitted collars which cause sore shoulders and sore necks. Even saddle horses, although they receive prolonged, careful training for riding, are not so well fed and groomed as one would expect.

The cattle are mostly of the beef type. Yes, you've guessed it—Herefords. In perhaps no other section of the United States is a single breed so universally raised as is the Hereford in the Southwest. In the routine vaccination against blackleg, we use blackleg bacterin. We have seen trouble from the use of the filtrate. When we vaccinate calves under three weeks of age, we revaccinate them later, especially if they are to be kept for breeding.

Carcinoma of the eye is rather common among the Herefords in this section. It yields fairly well to surgical treatment if limited to the eyeball or other tissue which can be removed. Other veterinary work with cattle here at the college consists of the usual run of castration, dehorning, indigestion with or without bloat, and obstetrical work.

Vaccination of our sheep against ecthyma, or "sore mouth," is routine, and has proved very efficient. Parasites encountered in sheep are principally stomach worms, tapeworms, and "grub in the head." Infection with various forms of Clostridium and motile, spore bearing aerobes have been observed, and also muscular rheumatism—cause unknown. Sporadic cases of urinary

This narrative reflects veterinary conditions in the Southwest, as they appear to a veterinarian who came there from the East. To soften possible adverse criticism of the "wildness" of this section, the author reminds us that even "civilized" portions of the country have their wild aspects—for example, he recalls that some years ago he barely survived a New Year's Eve celebration in Chicago! He adds:

"I think we average not more than one real 'honest to goodness' shootin', cuttin' fight a day. Of course, to come into this classification, a major injury to one of the participants must be inflicted. It can't be just a cropping of one ear, or even both ears. Somebody must at the least get an arm or a leg shot off or cut off. As a rule, no one has time to express his choice of instrument for the amputation, least of all the recipient. In spite of all this, we live on one of the main transcontinental highways, U. S. 80, and really have had friends from as far east as Ithaca, N. Y., visit us. Of course, Ithacans are brave people. We even take them south of the border before they leave."

calculi occur among our feeder lambs, and we think we have observed listerellosis also. Some of the infectious diseases of sheep are just about as clear as mud, and our literature upon them is of the same lucidity.

Swine diseases are few, perhaps because swine are few. We vaccinated our fall shotes with crystal-violet vaccine about a month ago, and no reaction was noticed. Routine anti-hog cholera vaccination has not been practiced in the college herd. Swine taken

COOL IN SUMMER, WARM IN WINTER, INEXPENSIVE

Typical 'dobe residence in "Old Mesilla," about six miles from the New Mexico A. & M. College. Mesilla, a wholly Mexican village, formerly the capital of both Arizona and New Mexico, was founded about 250 years ago

to shows have been protected with serum alone.

■ Students majoring in animal husbandry comprise a large percentage of those taking the courses in animal anatomy and physiology. These boys come from the farms and ranches and have a background that helps them to understand animals. With few exceptions they have been satisfactory students in this work.

The animal anatomy and physiology course includes enough fundamentals of the two subjects to enable students to better understand our domestic animals, especially with respect to nutrition, and to prepare them for the course in diseases and sanitation which follows. In the latter, the importance of diagnosis and some idea of the many factors involved in general care and management of animal diseases are taught. These include breeding, feeding, housing, sanitation and isolation as they relate to disease control and vaccination.

■ As a member of the experiment station staff, the veterinarian cooperates with the departments of the college that have need of veterinary consultation or assistance in their respective projects.

When no professional veterinary service is available and county extension agents need help on animal disease problems, it is given through correspondence, consultations and trips of investigation and education. If, on these trips, a diagnosis cannot be made from the history, clinical symptoms, and gross necropsy findings, specimens are brought to the laboratory for further study. Occasionally meetings are

STAKED PLAINS

More desert vegetation, but better grazing ground than that shown on page 302, for every few hundred yards a miniature bunch of grass can be found. The seed stalks of the Spanish bayonet gave the area the name "Staked Plains" in the geographies of 60 to 70 years ago. When a tenderfoot asks the New Mexican rancher why he doesn't dehorn his cattle he is apt to get this answer: "They would starve to death without their horns." When asked why the reply is: "We leave the horns on them so when they find a bunch of sprouting grass they can fight the others away till the grass gets big enough to eat"

held in various localities, at which problems puzzling owners of animals are discussed.

■ Having practiced veterinary medicine or taught it in Kansas, Michigan, New York, Ohio and California before coming to New Mexico, the author has had a varied environment from which to gather impressions. The Californians are perhaps the

most sensitive to adverse criticism regarding their state; New Mexicans are not so thin-skinned, but the natives of almost any state are likely to think their own habitat is the promised land. Be that as it may, the health and happiness of a rural community closely parallels the health and comfort of its domestic animals, especially in a livestock section such as this. A factor in the environment lethal to livestock is often injurious to the health and dangerous to the lives of those caring for the animals. Certainly it is inimical to their prosperity and lowers in some degree their standard of living.

Atmospheric conditions in this section of the state are salubrious for both man and animals, but because of the irregularities of the temperature, cold nights following extremely hot days, animals would do better if they had protection somewhat like that afforded them in other sections of the country. A shed with a roof and three enclosed sides is desirable, especially for young animals. The open side should face east to benefit from the morning sun and the afternoon shade. Since yellow corn and other fat- and heat-producing grain is scarce, very little is fed. This makes it more than ever essential that the animals should have some protection from the extreme variations in temperature that occur during a 24-hour period. In winter a temperature of 80°F. in the afternoon and ice on the puddles the next morning are commonplace; 50° at sunup will set one's teeth chattering when one has burned at 100° twelve hours earlier.

Lack of grain and widespread areas of many varieties of desert grasses make this a range country. Lambs and calves are usually sent to the corn belt for fattening.

HUECO TANKS

The tanks referred to by the author are artificial ponds. However, there are occasional natural water holes on the desert. The one shown is a very famous watering place about 30 miles from El Paso, Texas. Here the early Spanish explorers of the region, and after them the pioneers, stopped for water and rest on their trek across the limitless desert. The Indians disputed with both of them the right to occupancy and several bloody battles were fought here. Later, outlaws made it a rendezvous to be dispersed years after by the U. S. Cavalry. Now it is a bright spot in the cattlemen's realm

Losses from malnutrition occur where a range is overstocked, when there is a drought, or when ranchers do not supply needed minerals such as calcium or phosphorus. Then deficiencies take a heavy toll. Malnutrition and animal parasites are twin evils. When animals are inadequately nourished they become infested more easily, and in turn, when the parasites have established themselves, malnutrition is intensified.

Lack of care plays an important part in the extensive loss from infectious diseases —much greater than the owners realize. Some ranchers, however, figure that they can take losses up to a certain percentage more profitably than they can give preventive measures to the whole herd or flock.

■ Another important factor affecting the health of this community is the drinking water. Much of the livestock on the range is watered from dirt tanks which catch the run-off. The animals drink from them until the tanks go nearly dry; then the rain or snow from the mountains re-fill them. Vegetation grows in them at low water, and when flooded the contents become an infusion of dead vegetation—a favorable medium for bacteria and parasites. Animals wade into the tanks and during hot weather remain there for long periods, fouling the water and thus adding to the already massive contamination. The pH of the water varies from 7.3 to 7.8; a state of alkalinity particularly favorable for the Clostridium group. When animals are watered from deep wells the condition is somewhat better; however, the water pumped into large metal or earthenware reservoirs soon becomes contaminated and remains that way because it would be a waste of water to cleanse the containers. Therefore it is not a great deal better than the surface water in the dirt tanks. In the valley, conditions are not much better, for there the animals frequently drink from irrigation ditches or shallow wells into which irrigation water has flowed.

Drinking water for human consumption gets scant attention, and while mortality statistics in this connection are not often sufficiently spectacular to attract the attention of health officials, the condition should be given thorough study and methods evolved by which it may be remedied.

■ Stimulated by state and federal educational projects on breeding, feeding and other factors in the prevention of losses from animal diseases, considerable progress has been made; but much more needs to be done. The animal husbandry of the state is badly in need of a professional veterinary service, but I have no solution to the problem of supplying it.

■ Some of the things which we might call "local color" make the Southwest interestingly different. There is a genuineness about the dress and talk of the cattlemen, cowboys, and cowgirls at work or at play not found when they are depicted in the circus. Men in these sections spend years of patient work developing good roping horses. In veterinary work one finds efficient help among owners and cowhands. I once removed a cancerous eye from a large Hereford bull with the bull's head tied to a post and a rope on the hind feet tied to an empty saddle on a well-trained cow horse. The bull had been given chloral hydrate; local anesthesia also was used. In spite of this there was considerable struggling at times. Whenever it was necessary to tighten the rope, a word from the cowboy who was helping me at the bull's head brought a quick response from the cow horse, and the rope became taut. That horse stood at least 45 minutes without being hitched or touched, reins on his neck, facing the operation a rope's length away, and obeyed absolutely the commands of his master.

Horses and saddles, boots and spurs, big hats and "loud" shirts, and the people who use them or wear them without affectation, make the "local color" of New Mexico. The men and their methods are a result of the environment in which they live. The livestock industry too conforms with what is furnished by nature to support it. To live and thrive in the range country, men must be of a sturdy, rough and ready type and follow the Western philosophy: "Live every day so you can look a man straight in the eye and tell him to go to hell."

Chemical Aspects of Plasma Therapy In Veterinary Medicine

By JOHN A. UTTERBACK, El Paso, Texas

THE addition of equine plasma to the armamentarium of the veterinarian seems to be indicated. Apparently the pathological influences which unbalance the fluid systems in the Equidae may be alleviated, at least in part, by the use of plasma —that portion of the blood which remains after the corpuscles have been removed. Recent investigations indicate that plasma maintains protoplasmic irritability, promotes the function of plasma proteins in capillary permeability and tone, and affords diuresis. It helps to maintain blood pressure, augments volume and buffer action, gives protection against shock, and aids in wound repair and in antibody formation.

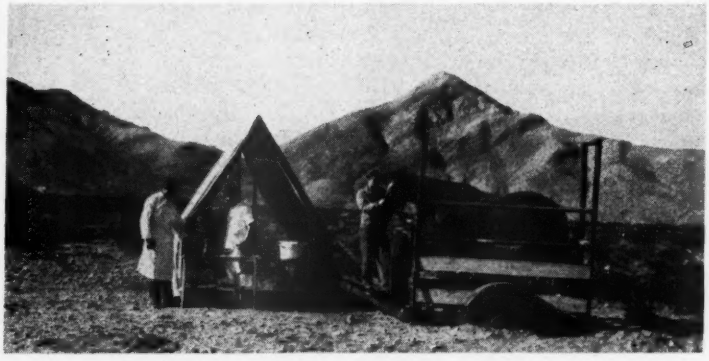


Fig. 1. Plasma production unit supervised by Doctor Utterback. A setup such as this is adaptable to making blood plasma in the field. The portable stocks (right) is ideal to restrain the donor for drawing blood. The centrifuge (shown in the tent) is plugged into a small generator unit as is also a small refrigerator (not shown). One chest (shown in the tent at left), suitably arranged for carrying glassware and bottles, is easily prepared. Electric generator and refrigerator, table, chest, autoclave, towels, instruments, the tent, etc., are transported in the portable stocks when the hospital is moved

The plasma contains all but a small portion of the 9% of total solids of the blood, since the proteins (albumins, globulin, fibrinogen, prothrombin) contribute 83% of the blood solids. Fibrinogen causes coagulation of the blood. The albumin and globulin fractions maintain the water balance between the blood and the tissues. This latter property is dependent upon the attraction for water which is inherent in proteins. It is true that the osmotic pressure of the plasma proteins is almost negligible when compared with that of the crystalloids; nevertheless the latter, unlike the proteins, play no role in the distribution of the water, because of the fact that they pass freely through the cellular walls. Capillary injury often brings about an abnormal partition in the body water by allowing the plasma proteins, as well as the crystalloids, to pass through the capillary endothelium into the tissue spaces. Investigations in dogs have shown that mechanical, thermal and chemical trauma, and oxygen depletion often cause increased capillary permeability.

The albumin, because of its smaller molecule and high molecular weight, and the fact that it is present in larger quantity, is more important in the distribution of water than is the globulin. The serum albumin maintains the colloidal osmotic pressure of the intravascular fluid by decreasing the porosity of the walls of the vascular channels. Once this protective mechanism is disturbed, the fluid balance between the intravascular and the extravascular fluids becomes disrupted. Furthermore, this disturbance is accompanied by an ingress or egress of cell fluid and its various inorganic cations and anions—sodium, potassium and the chlorides.

The intravenous administration of aqueous solutions dilutes the plasma chlorides in the blood to a concentration which allows the injected fluid to diffuse from the vascular stream; and reduces the protein concentration to an edema level. In this state of hydremic plethora diffusible chloride ions and bicarbonates are thrown out of equilibrium.

Fig. 2. Citrated blood in a 325cc centrifugal vacuum flask (centrivac) containing 35cc of 2½% sodium citrate solution. The centrivac, rubber stopper, intravenous tubing, needles and needle tube are washed thoroughly, assembled (as shown), wrapped in muslin and autoclaved for 30 minutes at 15 pounds pressure. Only after a donor is restrained and the area prepared along the jugular vein, is the muslin removed from the assembled, sterile units. The intravenous needle is then taken from the tube, flamed and immediately inserted into the donor's vein (Fig. 3)

In the state of health the base (potassium) resides largely in the cells of the body. Half of it is attached to hemoglobin; the remaining half is available for combination with chlorides and carbonates. In the plasma sodium is widely distributed, approximately one-tenth being attached to protein, the remainder available for combination with chlorides and carbonates. The concentration of the chloride ion in the blood plasma is twice that in the blood cells. However, the total of the osmotically active electrolytes is equal in cells and plasma. As the CO_2 tension of the blood is changed there is an altered distribution of the chlorine and bicarbonate between the cells and plasma. An increase of CO_2 increases the H_2CO_3, which combines with the base previously attached to the hemoglobin. This increases the additional formation of bicarbonate. The equilibrium is soon restored by some of the bicarbonate ions passing from the cells to the plasma and an equal amount of chloride leaving the plasma for the cells.

From this it may be seen that the chlorine (Cl) and the bicarbonate (HCO_3) ions pass through the cell membranes readily, whereas the sodium and potassium ions do not.

During the period of disturbed fluid balance the acid-base balance is not main-

Fig. 3. (Doctor Utterback at right.) The donor is easily restrained in the portable stocks. The area for the venepuncture is shaved, painted with iodine and the neck clothed with sterile towels. This area is exposed through an opening in the towels and the venepuncture made immediately. The blood is drawn into the centrivac containing the sodium citrate (Fig. 2 shows a small quantity of blood so drawn). As soon as the blood is drawn the bleeding needle is removed and the tube attached to the air outlet in the stopper as shown in Fig. 4

Fig. 4. Immediately after withdrawing the blood into the centrivac (Fig. 2) the intravenous tubing is disconnected from the bleeding needle. The hub of the needle or the glass tubing, as the case may be, which has been inserted into the stopper for the intake of air, during the assembling of the unit, is now flamed, as is also the disconnected end of the tubing which is immediately adjusted over the flamed needle or glass tubing. This procedure secures blood in a closed system. The assembly as it appears before and after use is shown

tained. The easily diffusible chloride ion becomes diluted and lost from the vascular tree and the cell membranes become permeable to potassium, resulting in its loss into the vascular fluids while at the same time sodium is retained in the body cells. In animal medicine we see various conditions that necessitate readjustments in the circulatory systems. Often, however, the compensatory capacity of the body is sufficient to forestall a fatal issue.

Among prevalent conditions involving circulatory pathology one may name dehydration, exhaustion, infections and shock. In fact, the latter may be defined as a condition of circulatory failure induced by trauma, by discrepancy in the size of the vascular bed, by inadequate intravascular volume or by tissue anoxia, to which many factors may contribute. One is forced to the conclusion that though the exact genesis of shock is obscure, it represents probably a group of circulatory failures of different origins, characterized by an acute oligemia.

Fig. 5. Equipment for the transfer of the supernatant plasma from the blood clot into a sterile container from which it may be used immediately or stored for future use. The large Erlenmeyer flask facilitates the collecting of large volumes of plasma. After the citrated blood stands at 34° F. for 48 to 60 hours the clot settles and the supernatant plasma may be drawn off into a smaller centrivac (shown behind the Erlenmeyer flask at the right) and centrifuged to throw down the fibrin veil which does not settle out in this period of time. As a matter of practice the upper half or more of the supernatant plasma, after settling for 60 hours in the large Erlenmeyer flask, is suitable for use and is then drawn into the storage flask. It can be used then or later. The remainder of the plasma is drawn into the centrivac and centrifuged. It is then transferred to the storage flask (as the one shown in the center of the illustration) for immediate or future use. In the transfer from one flask to another a closed system of tubing is used and the plasma is never allowed to come into contact with air, except that which has been filtered through concentrated sulphuric acid or liquefied phenol. Where a good technic is employed contamination of the plasma is rare. Large quantities of it can be stored for several weeks with insignificant loss. However, the source from which to prepare plasma is usually so ample that it should seldom be necessary to store more than a week's supply. This can be maintained by scheduling plasma preparation one day each week. If desired the plasma may be dried readily with very simple apparatus and stored indefinitely

Plasma therapy holds forth a potential significance as a rational therapeutic advance in modern animal medicine. Plasma presents to modern veterinary medicine a method of control of the balance between the fluid systems in the body. Moreover, it contains protein, which is a component of every living cell and is the most valuable constituent of living protoplasm. The protein derivatives contained in plasma (albumins, globulins, amino acids, etc.) all yield nitrogen and are utilized in fundamental processes, such as preservation of proper osmotic relationships, sources of energy, synthesis of hormones, replacement of tissues and nutritional repair.

There are simple blood tests that reveal often considerably in advance of clinical symptoms when plasma injections are indicated.

Sulfaguanidine Therapy for Calf Scours*

By W. T. S. THORP and J. F. SHIGLEY
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SULFANILAMIDE derivatives, particularly sulfathiazole, have been used by a large number of workers for various intestinal infections. Kolmer[1,2,3] has used sulfanilamide, sulfapyridine, and sulfathiazole, on experimental *Eberthella typhosa* (*B. typhosus*) infections and for experimental *Es. coli* infections in mice. In 1940 Libby and Joyner[4] reported on the action of sulfathiazole on some of the colon-typhoid dysentery group of organisms. Many of the recent investigations with intestinal disease have given varied results on the efficacy of this group of drugs.

Marshall and his associates[5,6] have suggested that sulfaguanidine has a low absorption rate from the gastrointestinal tract as compared with other sulfonamides and might be of possible value in enteric infections. Marshall and his co-workers[5] have observed its absorption, excretion, and toxicity in mice, rabbits, and dogs. Cameron and McOmie[7] studied the effect on the blood, the fecal concentrations, and the toxicity of sulfaguanidine administered orally to sheep and swine. Their results showed that swine have a greater tolerance for the drug than do lambs, and that its absorption rate is considerably lower than that of sulfanilamide, but that a relatively greater amount is conjugated. They found that in the cases where toxicity was produced a tubular nephritis resulted.

Sulfaguanidine Therapy

All the calves from a large dairy herd that showed clinical symptoms of a marked dysentery or scours were treated with sulfaguanidine. Their ages ranged from two days to two weeks at the time of treatment. The dosage was determined on the basis of weight, but varied slightly in individual cases. After some preliminary studies, the total daily dosage was divided into three equal parts and given morning, noon, and night. The drug was administered in ¼ oz. gelatine capsules. Over a period of one year, 40 calves were treated. The results obtained on ten calves, representative of the total group, are shown in Table I.

Most of the scours occurred in calves from 8 to 12 days of age. The feces varied from a very thin, watery type streaked with bloody mucus, to a cheesy, stringy type. No other medicinal treatment was administered, with the exception of two cases which received a bismuth compound. Three calves showed some evidence of toxicity. This was indicated by extreme nervousness and a kicking at the flank, suggesting considerable pain or a colic-like condition. Upon withdrawal of the drug, these symptoms disappeared.

The concentrations of free and total sulfaguanidine in the blood, shown in Table II, are for a representative number of calves administered the average dosage used in the treatment of scours. Two of the three calves reported in Table II showed evidence of a moderate to severe dysentery, while calf No. 940 showed no dysentery. The amount of sulfaguanidine in the blood was determined by the method described by Bratton and Marshall.[8]

Toxicity Studies on Calves

Three calves were given large doses of sulfaguanidine in an attempt to produce toxic symptoms for the purpose of studying any lesions which might be present.

*Authorized for publication on November 24, 1941, as paper No. 1062 in the Journal Series of the Pennsylvania Agricultural Experiment Station.

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[8] Bratton, A. C. and E. K. Marshall, Jr., 1939. *Biol. Chem.* 128, p. 537.

TABLE I. DOSAGES OF TEN REPRESENTATIVE CALVES GIVEN SULFAGUANIDINE AS A COURSE OF TREATMENT FOR CALF SCOURS

Calf No.	Weight (Pounds)	Breed	Dose in Grams* 1st Day	2nd Day	3rd Day	4th Day	Remarks
913	101	Brown Swiss	17.5 (.173)	10.5 (.104)	14 (.138)	3.5 (.035)	Recovered
918	88	Guernsey	14 (.159)	14 (.159)	7 (.079)	3.5 (.039)	Fair Recovery
926	70	Holstein	10.5 (.15)	7 (.11)	3.5 (.05)		Died
939	80	Jersey	17.5 (.218)	10.5 (.131)	7 (.09)	***	Fair Recovery
945	60	Brown Swiss	7** (.116)	10.5 (.175)	7 (.116)		Good Recovery
958	85	Guernsey	14 (.164)	14 (.164)	10.5 (.124)	7 (.082)	Good Recovery
961	80	Guernsey	14 (.175)	14 (.175)	10.5 (.131)	7 (.087)	Good Recovery
960	65	Guernsey	10.5 (.16)	10.5 (.16)	7 (.108)	7 (.108)	Good Recovery
963	75	Guernsey	14 (.187)	14 (.187)	10.5 (.14)	7 (.187)	Good Recovery
968	80	Guernsey	14 (.175)	14 (.175)	7 (.087)	3.5 (.043)	Good Recovery

*Grams per pound of body weight given in parentheses. **Started dosage at noon. ***Slight symptoms of toxicity.

TABLE II. THE CONCENTRATIONS OF FREE AND TOTAL SULFAGUANIDINE IN THE BLOOD OF A REPRESENTATIVE NUMBER OF CALVES GIVEN THE THERAPEUTIC DOSE OF SULFAGUANIDINE.

Calf No.	Weight in Pounds	Day of Treatment	Dose in Grams	Concentration of Sulfaguanidine Free (Mg %)	Total (Mg %)
940	70	1st	3.5	0.85	1.59
		2nd	10.5	0.95	3.48
		3rd	7.0	0.53	1.05
942	84	1st	10.5	0.96	1.60
		2nd	10.5	0.78	1.56
		3rd	7.0	0.53	0.91
943	90	1st	17.5	0.75	1.05
		2nd	14.0	1.40	2.07
		3rd	7.0	1.72	4.00

Table III shows the blood leucocyte and erythrocyte counts and the blood level of sulfaguanidine of these animals. When the dosage was started, calves No. 909 and No. 910 showed a moderate dystentery, but calf No. 908 was normal. Approximately three times the therapeutic dose was administered. Calves No. 908 and No. 910 showed evidence of toxic symptoms on the morning of the second day of treatment, while calf No. 909 began to show toxic symptoms later the same day. These symptoms became more marked until the calves either died or were killed. The first symptoms were extreme nervousness and evidence of pain in the flank and lumbar region. The symptoms on the third day of treatment consisted of stiffness of the limbs and extreme nervousness. When the calves lay down, they were able to rise only with considerable difficulty. On the fourth day, these symptoms were more pronounced and the

TABLE III. THE BLOOD CELL COUNTS AND THE CONCENTRATIONS OF FREE AND TOTAL SULFAGUANIDINE IN THE BLOOD OF CALVES GIVEN TOXIC DOSES OF SULFAGUANIDINE

Calf No.	Weight in pounds	Day	Dose in Grams*	Leucocyte Count	Erythrocyte Count	Concentration of Sulfaguanidine Free (Mg %)	Total (Mg %)
908	107	1st	54	8,000	6,000,000	1.15	3.17
		2nd	36	12,000	6,200,000	2.12	3.78
		3rd	18	13,400	7,000,000	3.22	11.74
		4th	12	14,800	7,250,000	7.58	14.06
		5th	6	16,000	7,150,000	5.92	12.06
909	115	1st	54	11,000	5,000,000	1.31	3.88
		2nd	36	11,400	5,000,000	1.80	5.75
		3rd	18	11,000	5,500,000	1.98	6.02
		4th	12	11,000	5,500,000	1.88	5.26
		5th	6	8,000	5,400,000	1.28	6.30
910	130	1st	60	10,000	7,500,000	2.10	4.10
		2nd	40	13,000	5,000,000	3.67	18.50
		3rd	20	27,000	5,000,000	7.18	30.65
		4th	12	28,000	5,500,000	8.58	40.00
		5th	6	25,000	6,000,000	12.12	28.90

* Divided into approximately three equal doses given three times per day.

calves were hardly able to stand. A complete anorexia was noted at this time. On the fifth day the calves were moribund and calf No. 909 was killed. Calf No. 910 was killed on the afternoon of the sixth day and calf No. 908 died on the eighth day.

The rise in the blood leucocyte count shown in Table III for calves No. 908 and 910 was contrary to most reports on the toxic effect of the sulfonamide drugs. The rise of the non-protein nitrogen of the blood and the blood levels of sulfaguanidine for calf No. 910 are shown in Chart No. I.

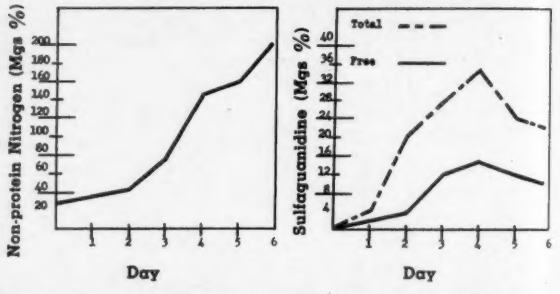
On necropsy the predominant gross lesion observed was in the kidney, which was very edematous and swollen. The cortical substance of the kidney was a yellowish white and the medulla dark red. A few small hemorrhagic areas were observed in the cortex. The liver and intestines showed no gross pathological changes.

Microscopically, the kidney lesions were suggestive of a nephrosis in some respects; however, considerable inflammatory reaction was found in many areas. There were numerous degenerated and necrotic tubules. Many tubules were distended with a homogenous material mixed with numerous leucocytes. The epithelium of many tubules was necrotic and in the more severely affected areas the epithelium was desquamated and the tubule was filled with a cellular exudate mixed with considerable homogenous material. The most severe tubular lesions were in the proximal convoluted tubule and in the distal portion of the convoluted tubule. Many collecting tubules were filled with casts which appeared as crystalline material in some, and as a homogenous material mixed with cells in others. Most of the glomerular capillaries contained many red blood cells. Some necrosis and desquamation of the visceral glomerular epithelium had apparently taken place. In two cases there was observed some thickening of the basement membranes in the glomerular tuft. Some glomeruli showed a fibrinous exudate with many red blood cells in the capillaries, indicative of an acute glomerular nephritis. However, the predominant lesion of the kidney was the marked tubular distention, necrosis of the tubular epithelium, and the occlusion of many tubules.

Discussion

The response of 40 calves to treatment with sulfaguanidine differed somewhat in individual cases, but for the most part, showed promise of consistent beneficial results. Age difference did not seem to affect the response to the drug so much as in the use of sulfapyridine for calf pneumonia. Calves one week old should be treated with sulfaguanidine for not more than six days. The initial dose should be large and then decreased rapidly after the second day.. In this study, calves weighing from 90 to 100 pounds were usually given a larger dose for two days, followed by a marked reduction in the dose of sulfaguanidine on the third day. In smaller calves, the dosage should be reduced on the second day.

Chart I. Non-protein nitrogen and free and total sulfaguanidine in blood of calf given excess of sulfaguanidine



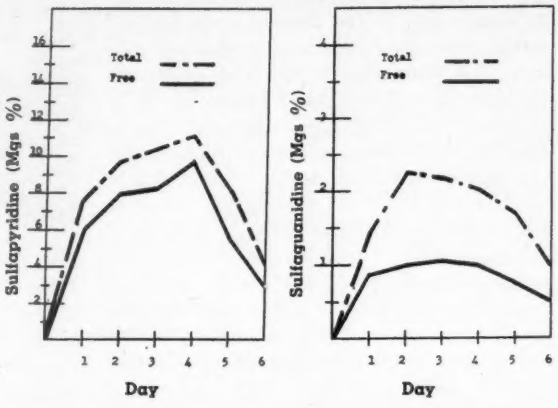
Experimental calves given approximately three times the therapeutic dose developed an acute nephritis and probably died from a uremia. If symptoms of toxicity occur in calves during the course of treatment, the drug should be withdrawn at once.

The absorption rate of sulfaguanidine from the intestinal tract was apparently very much lower than that of sulfapyridine[9]. A comparison of blood levels of sulfaguanidine and sulfapyridine (Charts II and III) shows that the difference between the total and free sulfaguanidine of the blood was greater than the differ-

[9] Thorp, W. T. S., J. F. Shigley, and A. K. Anderson. 1942. Sulfapyridine in the treatment of calf scours. *J. A. V. M. A.* 100:780, p. 225.

ence between the total and free sulfapyridine. This was particularly so in the cases of the toxic dosage (Chart III). The above would indicate that a relatively greater amount of sulfaguanidine is conjugated than in the case of sulfapyridine. These findings compare well with those of Cameron and McOmie for sheep and swine.[7] The injurious effect of the toxic dosage on the kidney was probably due to its inability to eliminate the less soluble conjugated form of sulfaguanidine at a rate sufficient to prevent the nephritis. The effect on the kidney would indicate that absorbed sulfaguanidine may be considered more toxic than absorbed sulfapyridine.

Chart II. Concentration of free and total sulfapyridine and sulfaguanidine in blood of calves given therapeutic doses



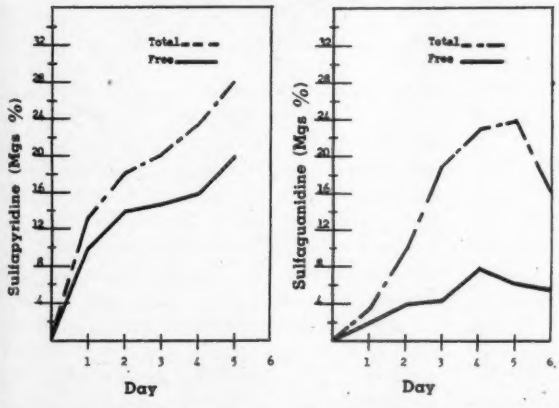
Summary

Forty calves diagnosed as having typical calf scours or dysentery were treated with sulfaguanidine. One of the calves did not respond to treatment and died of calf scours. The remainder showed a fair to very good recovery. The calves treated with sulfaguanidine did not appear to lose their appetite to such an extent or become as sick from the dysentery as those receiving other forms of treatment.

The suggested maximum therapeutic dosages are as follows: calves 75 pounds and over, 0.15 to 0.17gm per pound of body weight per day, divided into three equal parts and given morning, noon, and night; calves under 75 pounds, 0.13gm per pound of body weight, given in the same manner.

The dosage for all calves should be reduced on the third day by 0.05gm per pound of body weight, and not over 0.06gm per pound should be given on the fourth day. An overdose of sulfaguanidine, in our experience, causes severe damage to the kidney, manifested by a severe tubular nephritis. Experiments are in progress to determine more definitely the exact tolerance of the calf for sulfaguanidine and the effect of the drug on the microflora of the intestinal tract. The preliminary results reported here have been sufficiently encouraging to warrant further investigation.

Chart III. Concentration of free and total sulfapyridine in blood of calves given toxic doses



ACKNOWLEDGMENTS

The writers wish to thank the Department of Dairy Husbandry for their assistance and for providing the experimental calves; Mr. I. Zipkin of the Department of Agriculture and Biological Chemistry for the chemical determinations on the blood; and the Lederle Laboratories, Pearl River, New York, for furnishing the sulfaguanidine.

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Immunological Studies with Hog Cholera Tissue Vaccine*

By WILLIAM H. BOYNTON,[1] D.V.M., GLADYS M. WOODS,[1] M.A., F. W. WOOD,[2] D.V.M., and N. H. CASSELBERRY,[2] D.V.M.

A CAREFUL consideration of the methods in use at the present time for the control of hog cholera shows that several plans are employed. In some countries slaughter and quarantine methods are carried out. The plan followed is essentially that employed here for the eradication of foot-and-mouth disease. Such methods are effective, but the use of this plan in the United States would be very troublesome and expensive.

A second method is the use of anti-hog cholera serum alone. Anti-hog cholera serum is a safe and very efficient product which, if administered in proper dosage, protects against cholera infection for a period of from two to three weeks. The serum alone method is the safest and most efficient one for the control of outbreaks of cholera. Objections to the use of serum alone are the short period of protection afforded and the expense involved.

A third method in common use is the serum-virus or simultaneous method for active immunization of swine against cholera infection. This method has been widely used and it has been of great value in the prevention of losses from cholera; but there are, and always will be, very definite and valid objections to a method of immunization which requires the use of unmodified virus in the field.

A fourth method for the immunization of swine against cholera by means of hog cholera tissue vaccine is now coming into use. This product is free from the disease-producing propensities of hog cholera virus.

When anti-hog cholera serum and virus are used for the immunization of swine against cholera, a reaction following the administration of the virus frequently results in serious herd losses, because hog

cholera virus aggravates bacterial infections which may be present at the time of vaccination or acquired shortly thereafter. Practically, this means that weak pigs or pigs apparently healthy but suffering from infections other than cholera, are, if exposed to cholera virus, as in the simultaneous method, usually eliminated. On the other hand, such pigs are unaffected by the administration of tissue vaccine, and come through the vaccination with no greater loss than would normally occur if the animals were left untreated. If pigs vaccinated by either method are later exposed to cholera virus, the survivors in the serum-virus treated group will probably show little or no reaction to the exposure, but the weak pigs in the tissue vaccine treated group may show sickness and losses may occur. If, however, no exposure to cholera occurs following vaccination, the weak pigs in the tissue vaccine treated group ordinarily will reach market. In brief, the simultaneous method results usually in speedy elimination of the weak pigs; the tissue vaccine method affords the weak animals a good chance of survival.

More definite information on the effect of certain modifications of the tissue vaccine method is desirable, and experiments have been conducted during the past two years to determine: (1) the duration of immunity in pigs immunized with a single dose of tissue vaccine; (2) the immunity resulting from the intracutaneous administration of tissue vaccine; and (3) the degree

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of active immunity which may be expected from the simultaneous use of anti-hog cholera serum and tissue vaccine.

Experiment No. 1

In the experiment on the duration of immunity following a single dose of tissue vaccine, groups of susceptible pigs were given, respectively, 10cc and 5cc doses. These were held with susceptible control pigs for varying intervals and then given hog cholera virus to test their immunity.

In the first portion of this experiment, one group of seven pigs, given 10cc of vaccine each, was held with three unvaccinated controls for approximately three months following the administration of vaccine and then the vaccinated and control animals were injected with 2cc of hog cholera virus each. The controls developed cholera; the vaccinated animals remained well. A similar group receiving the same dosage gave similar results four months after vaccination.

In the second portion of this experiment, six groups of seven pigs each with three controls to a group were treated with 5cc of tissue vaccine; held, respectively, for periods of approximately one, two, three, four, five, and six months[3] after treatment; and then given an injection of 2cc of virus each. One of the vaccinated pigs in the one-month group was discarded before virus injection, leaving six pigs for the immunity test. In the group kept for five months, one of the vaccinated pigs died. Two others sickened but recovered. Two of the vaccinated pigs in the group held for six months showed sickness but all survived. All of the vaccinated pigs in the other groups remained well. The controls on all the groups developed cholera in the usual time, with the exception of two controls on the two-month group, which sickened from a condition other than cholera and were discarded.

No essential difference between the effects of the 10cc and 5cc doses was noted, but the immunity induced by a single 5cc dose appeared to be somewhat less complete five or six months after vaccination than it was at the earlier periods.

In the third portion of this experiment, 103[4] pigs, assembled from 27 different farms, had been vaccinated in the field by practicing veterinarians with a single 5cc dose of tissue vaccine. These pigs were from herds with varying histories; some represented herds free from trouble, others had a history of losses from various causes in previous years. The time between vaccination and the immunity test varied from approximately one month to six and one-half months.[4] To check the immunity of the vaccinated animals, they were injected with 2cc of hog cholera virus each. Eight unvaccinated controls used in this experiment received the same dose of virus at the same time. All the controls and 10 of the vaccinated pigs sickened, presumably of hog cholera or complications. These deaths in the vaccinated groups occurred among pigs from six farms. The vaccinated pigs from the other 21 farms remained healthy. Three of these losses were from one farm, two each from two other farms, and one each from three farms. It is an interesting fact that all of the deaths occurred in pigs vaccinated for the shorter periods of time before the immunity test, and suggests that the better protection afforded pigs in the groups vaccinated for the longer periods before virus injection may have been due to the possibility that the older pigs had recovered from the bacterial infections so prevalent in the younger pig groups.

Experiment No. 2

To find out whether immunity may be induced by intracutaneous injection of tissue vaccine, a few swine were so treated.

In the first part of this experiment, a group of seven pigs was given an intracutaneous injection of 2cc of tissue vaccine; held, with three controls, for one month; and then injected with 2cc of virus. The controls developed cholera at the expected time, but all the vaccinated pigs remained well.

In the second part of this experiment, a group of seven pigs received an intracutaneous injection of 1cc of tissue vaccine and was held along with three controls for approximately two months before receiving virus. The controls developed cholera, and one of the seven vaccinated pigs died.

In the third part of this experiment, two groups of seven pigs and three controls each were used. In each group, seven pigs received an intracutaneous injection of 0.5cc of tissue vaccine. At the expiration of one month the vaccinated and control pigs in one group were injected with 2cc of hog cholera virus each. The second group was held for approximately three months and then all of the pigs were injected with 2cc of virus each. In each group, the three control pigs developed cholera, and two of the vaccinated pigs showed evidence of cholera infection for a few days, but all of the vaccinated pigs survived.

The results thus far seem to show that a very satisfactory immunity may be conferred by the intracutaneous administration of tissue vaccine, but these results need to be amplified before any definite conclusions can be drawn.

[3] Later results on a group of seven pigs tested eight months after vaccination show that they were satisfactorily protected.

[4] Figures from the latest field report indicate a total of 140 pigs from 38 farms given the immunity test and 368 days, the longest time interval between vaccination and this test. No deaths other than the ten reported above have occurred.

Experiment No. 3

In this experiment on the effect of the simultaneous use of anti-hog cholera serum and tissue vaccine, susceptible pigs were given simultaneous injections of 30cc of serum and 5cc of tissue vaccine. As in the previous experiments, these animals were subjected to immunity test at intervals varying from one, two, three, and five months after the administration of the serum and vaccine.

The first group of 14 pigs and six unvaccinated controls was held one month and then given 2cc of virus each. Two of the 14 serum-vaccine treated pigs died, and all six controls developed cholera.

The second group of 14 pigs was held, together with six controls, for two months before all were injected with 2cc of virus each. The controls sickened with cholera; one of the serum-vaccine treated pigs died, and two others sickened but survived.

A third group of seven pigs held, with three controls, for three months, was injected with 2cc of virus each. The controls developed cholera, but no losses occurred in the serum-vaccine treated group.

A fourth group of seven pigs was held, with three controls, for five months, and then each received the usual dose of 2cc of virus. The controls developed cholera; one death occurred among the serum-vaccine treated group, and five others sickened but recovered.

From this experiment, it seems plain that some active immunity may be expected in animals receiving the serum-vaccine treatment, but that the immunity produced is modified by the action of the serum. It would seem that serum and vaccine in combination may be useful in the treatment of herds exposed to hog cholera, and in herds in which animals sick from unknown causes render the use of serum and virus dangerous. In herds of this character it would be advisable to give a second injection of vaccine in from two to four weeks or as soon as the animals appear healthy.

Summary

In the experiments on the duration of immunity following the use of a single dose of tissue vaccine, pigs held up to four months after receiving a single 10cc dose and pigs held up to six[3] months after receiving a single 5cc dose, were protected satisfactorily against cholera infection. No detectable difference in the degree of immunity was shown between pigs receiving the 5cc and 10cc dosage.

Results of the experiment conducted in the field show that pigs receiving a single 5cc injection of tissue vaccine were protected for periods up to 202[4] days. As would be expected, a few pigs in the field experiment failed to show complete immunity against cholera. This fact further confirms previous findings that either pigs harboring bacterial infection when vaccinated fail to develop a solid immunity, or exposure to virus after vaccination favors the development of concurrent infections. The immunity shown under field conditions in this experiment seemed to be greater in pigs vaccinated for longer periods before exposure. This apparent contradiction may be explained on the grounds that the older animals, that is, those vaccinated for the longer periods, were freer from bacterial infections than the younger pigs.

Experimental trials with the intracutaneous injection of tissue vaccine indicate that susceptible pigs may be immunized against hog cholera by this method. Trials with the intracutaneous method are as yet insufficient to warrant any definite conclusions.

Experimental results following the simultaneous injection of anti-hog cholera serum and tissue vaccine seem to show that some active immunity may be expected from this treatment. However, there seems to be a definite modification of the immunity as compared with that obtained from the vaccine alone method, and, in general, the immunity seems to be reduced. Results so far would indicate that serum and vaccine in combination may be of value when used on herds in which losses are occurring from infections other than cholera, or in which there may be a suspicion that cholera infection exists, or when used on pigs purchased from sales barns or whose history is unknown.

The results reported here further demonstrate the adequacy and safety of tissue vaccine as an immunizing agent against hog cholera and as an agent which can be used without fear of aggravating intercurrent infections or spreading hog cholera infection.

Hydrogen Peroxide Treatment for Whipworms

By LEON F. WHITNEY, Orange, Connecticut

IN the September, 1939, issue of VETERINARY MEDICINE the author published a paper "Hydrogen Peroxide as a General Anthelmintic." The paper and results which a great many practitioners have since obtained with the treatment, have been the subject of discussion at veterinary meetings without end. However, the method remains the most successful treatment for whipworm infestation that we have today.

Of the objections that have been raised to the hydrogen peroxide treatment of whipworm infestation, not a single one has even hinted that a 1½%, or stronger, solution of the drug will not kill any intestinal worms that it touches. In short, there has been no criticism as to the efficacy of the treatment, but only as to its after effects. These include: bloody stools, severe tenesmus, and, in rare instances, death. Every injury reported has been due to *mechanical* factors—in other words, to faulty technic.

■ Let us consider these untoward results:

1. All are due to internal pressure exerted by the nascent oxygen liberated by the decomposition of the H_2O_2 within the intestine.

The use of a 1½% solution was suggested as being sufficiently strong. This is capable of liberating five times its volume of oxygen. If (1) a large amount of it is introduced into the colon quickly and (2) if this gives up its gas promptly and (3) if a sharp kink occurs in the gut, the colon may become too greatly stretched. The result is hemorrhagic areas and bloody stools.

In the original paper the author gave specific instructions not to introduce the H_2O_2 either under material pressure or rapidly. Where it is introduced slowly, so the liberated gas precedes the liquid along the intestinal canal, no harm results.

2. Many who gave the rectal injections forgot the instructions to have the lower bowel empty at the time of the treatment.

When the bowel is already full of feces and the solution is introduced there is less than normal room for expansion of the liberated oxygen and chance for mechanical harm.

3. The dilution.

Despite the fact that it was stated that a 1½% solution was satisfactory and that the usual drug store or commercial strength was 3%, some took the ordinary 3% commercial hydrogen peroxide and diluted that to 1½ parts per 100 and then said the treatment was not efficacious. Of course it wasn't. That solution was practically straight water. Diluting the 3% solution with equal parts of water is the correct procedure.

4. Too great pressure of the solution itself aside from the gas pressure was the principal cause of trouble.

One veterinarian who asked to be shown how to give the treatment, first demonstrated how he did it. He used an ordinary rubber douche bag attached near the ceiling with a hose about seven feet long. This he explained was the apparatus he used in giving enemas. He said that sometimes his dogs voided bloody feces from ordinary enemas and from washing "through and through." This pressure was too great in

itself. One could not expect other than disaster from the added pressure of the liberated, nascent oxygen.

Another veterinarian forced the solution in by means of a bulb-operated, pressure bottle in which quite a high pressure was built up. Others used various equipment, all building up a mechanical pressure too great for the intestine. They didn't read the original paper. They just saw it.

■ The equipment which is used at the Whitney Clinic consists of an ordinary 1000cc infusion bottle with a dispenser and a tube 24 inches long with a metal tip with an aperture $\frac{1}{64}$th inch in diameter. The dog is held by an assistant and the metal tip is inserted into the rectum. In a dog the size of a mature setter, an ounce is allowed to run in slowly. Bubbles rising through the solution in the bottle indicate it is flowing. When it stops the bubbles also stop. The lower end of the bottle is held not to exceed one foot above the dog; little pressure is thus engendered. At times some of the solution may be forced back into the bottle. That doesn't matter. Be patient. The flow will start again as the gas works forward and thus lowers the pressure in the rectum.

After approximately an ounce of the solution has passed into the intestine and the dog appears to experience no discomfort, a little more is allowed to run in. The first has had time to liberate its gas and that, with some fluid, has moved forward. After several ounces are in, the dog may strain. Then it is time to relax the pressure on the anus and allow the surplus gas to escape. Be careful to avoid ballooning the colon, for there is where damage from excess pressure generally occurs.

When word was received of bloody feces from the treatment, the author procured nine mongrels from the pound. All were given a large amount of H_2O_2 under considerable pressure until they vomited it. They were kept three to five days. Three of them developed bloody feces, another was severely affected. All were humanely destroyed. When their intestines were examined, the three that had voided bloody feces showed hemorrhages in the colon but nowhere else. Of the remaining six mongrels, five revealed reddened areas indicating too great an expansion, though they had passed no blood.

■ The only purpose of this paper is to assist fellow practitioners who want to eradicate whipworms from their own dogs or the dogs of clients. Therefore we must consider not only hydrogen peroxide as a general anthelmintic, but also as an agent solely for the purpose of removing whipworms. First a word about the whipworm, and this is important.

For some reason many practitioners appear to believe that the cecum is the sole habitat of the whipworm. This is a mistake. The whipworm lives anywhere along the small intestine. Maurice C. Hall long ago pointed out that when living conditions become crowded in the cecum many of the worms move into other parts of the intestine. The reason they are found in the cecum more commonly than elsewhere is probably because the dog has previously been wormed with the usual anthelmintics and all whipworms that were in the lumen of the small intestine have been killed. The anthelmintic used passed by the ileocecal valve and left the whipworms in the cecum unharmed.

Tetrachlorethylene is as much a specific for the whipworm as it is for the hookworm and roundworm, but it can't reach whipworms that are ensconced in the cecum. We read about the efficacy of several of the newer drugs against the whipworm. It is more than likely that tetrachlorethylene is fully as effective against that parasite as any of them. It is easy to take a dog badly infested with whipworms and dose it with

tetrachlorethylene and show an effectiveness of over 80%. I have done this, and obtained dozens of these worms from the feces. The egg counts were materially reduced a week after the treatment.

The only fair way to test any drug for its superiority to tetrachlorethylene as a whipworm anthelmintic is first to clear out the small intestine with a good agent and then to try the various drugs to determine how many, of the number remaining after the first treatment, are removed. These would be those from the cecum.

If this be done the efficiency of all of them will be found to be woefully weak as compared with that of H_2O_2.

Reports have been published on the eradication of whipworms by the introduction of various drugs into or in the vicinity of the cecum. Those who prefer this method will find that H_2O_2 produces the same results at less expense than with other drugs.

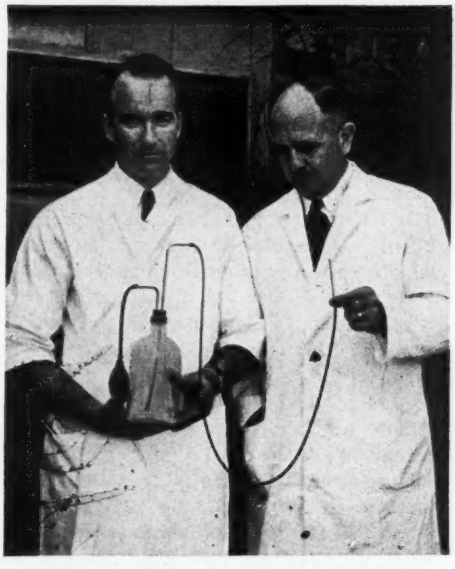
■ When the author discovered the value of the rectal injection of H_2O_2, he thought that it would prove the most efficacious method for eradication of all worms. Today he maintains that for effectiveness it has no equal, but he does not always use it. It takes too much time as compared with the oral dosage of capsules or pills. Today with his own dogs, used in research and as a hobby, as well as with most of the dogs brought to the clinic to be wormed, his practice is as follows:

First a very careful fecal examination is made. If no whipworm eggs are found, the dog is given tetrachlorethylene after 30 hours fasting. (The period for small puppies is 18 to 20 hours.) An hour later arecoline hydrobromide is given. Arecoline acts as a tapeworm specific and cathartic at the same time. The time consumed in these administrations is negligible. The efficiency is high. The dogs are fed an hour after the arecoline is given.

But if the dog is found to have whipworms, it is given the H_2O_2 treatment until it vomits. That seems to remove all parasites. It takes 10 to 15 minutes. However, if there is pressure of other work, the dog is given the treatment of tetrachlorethylene followed by arecoline hydrobromide. As soon as it has voided the watery feces which this treatment occasions, a 2% solution of H_2O_2 is injected slowly into the rectum; about one ounce of the solution to each 10 pounds of weight of the dog. It is allowed to remain in the colon until the dog indicates discomfort, which generally means between one and two minutes. Then the animal is turned loose to void the solution.

By this means we have treated some of the most valuable dogs in America with entire success. Subsequent fecal examinations reveal that it is fully as effective as the straight H_2O_2 method. It takes less time and there has been practically no complaint of bloody stools.

■ Dr. E. J. Frick of Kansas, who has used hydrogen peroxide extensively as an anthelmintic for dogs and who was the first to employ it successfully in horses, recommends a 1% solution. Undoubtedly it would possess a greater margin of safety if the injection is made too rapidly than the 1½% solution. Not having had any difficulty with the stronger solution when given as herein described, the author has made no study of weaker solutions.



The apparatus pictured is a simple yet convenient appliance for giving an enema to small animals. Doctor Whitney (right), the author, is adept in technic efficacious in worm eradication

Tenotomy in the Fox

During the last five decades fur farming, which started with a nucleus of a few half-starved, poorly cared for captive wild animals, has grown to be an industry with annual receipts totaling about 50 million dollars. In one state, Wisconsin, the income of the fur industry is exceeded by only one other, that of dairy production. Fur farming today, however, is no "get rich quick" scheme; profits can be realized only by use of good stock, proper care and feeding, and up-to-date methods of management—which certainly should include effective veterinary service. It therefore behooves the progressive veterinarian to acquaint himself with the problems of the fur farmers and their solutions.

Among the problems of the fox farmer which fall within the province of the veterinarian are the digging and climbing proclivities of the fox. He is by nature a burrowing animal, and when confined in a small pen this instinct is magnified, so that even in rocky soils a single animal may tunnel several feet in a night. Even if he does not succeed in freeing himself in this way, a place is provided into which the young may be taken to become chilled and predisposed to disease, or which becomes a drowning pit in case of a heavy rain. Flooring the pen with mesh wire is no solution of this problem, since the constant scraping of toenails in the corners soon crystallizes that portion of the wire, allowing easy breakage. The only permanent remedy is severing the flexor tendons of the animal's forepaws, thus destroying the ability to flex the toenails.

The tongs (shown at left) are used to catch and remove a fox from the pen. These are preferable to removal by hand because foxes, upon what they may consider sufficient provocation, are inclined to bite and the wound inflicted is a painful if not always a serious one. While the fox is still held by the tongs a second person grasps it by the neck and hind legs; without further restriction the animal may be examined, inoculated or a tenotomy, as here described, may be done

A technic for this tenotomy was described by Dr. E. J. Frick[1] in 1936. Since then, a simpler operation has been developed, which has the advantages of smaller, more superficial incisions, greater speed, and less probability of cutting the digital arteries and veins.

The success of the operation is dependent upon the ability of the operator to keep tension on the tendons he intends to sever. This necessitates contraction of the deep digital flexor muscle. The method of restraint may vary. Many types of commercial paraphernalia are on the market, but if an experienced fox handler is available,

[1] Frick, E. J., 1936. Tenotomy in the fox. *Vet. Med.* 31:12, p. 531.

it is probably preferable to have him use simple manual restraint, holding the hind legs taut in one hand and the neck collared by the other, with the body lying in lateral recumbency on the table. The foreleg is grasped by the operator with the left hand, the thumb pointing distally and in such a way that the points of the toenails rest on the medial side of the curved index finger. Usually when the paw is grasped in this way the fox will flex the digits in a "pushing away" reflex. If not, then a loud noise, shaking or striking the animal sharply, or blowing into its face, will usually stimulate this reaction.

A Bard-Parker No. 12 knife with a curved blade is now taken into the right hand in the manner of holding a pencil, the point of the blade directed dorsally in relation to the hand. The tendons cut are the four branches of the deep digital flexor entering the second to fifth digits. The site of the incision is directly over the second phalanx, where the tendon is most easily palpated. The point of the blade is merely inserted through the skin and punched into the taut tendon. Little or no slashing movement is necessary. Complete severence is recognized by the sudden release of tension of that toenail pressing into the curved index finger.

If the operator is careful not to make a slicing movement with the knife, but rather barely to press the tip of the blade into the tendon, the resulting hemorrhage is practically nil. Occasionally the digital blood vessels may be cut, but this is of small consequence.

On fox farms at Broken Bow, Nebr., where digging was once a serious problem, this operation is performed on approximately 400 pups each year. It has been practically 100% successful in keeping the animals from digging, and also seems to inhibit them from climbing the fences—behavior that often results in a fall and a broken back or leg. There have been no cases of severe hemorrhage, nor of infection, although little or no attempt at asepsis is made.

MAX GOULD, K.S.C. '42
Manhattan, Kans.

Acetonemia-Like Symptoms in Cows with a Hyperglycemia

In my practice there are twice as many cases of acetonemia as of typical or atypical milk fever. The usual case is one of long standing and has been in progress from two weeks to three or four months before I am called. It is a disease that the empirics do not understand, and since my practice is composed of empirically-minded farmers, they treat me also as an empiric. (That is, until they ask me what they owe.) They come to my office and say, "Mr. Chambers, are you the veterin?" I reply that I am the veterinarian and ask what I can do for them. They persist, "Dr. Doe, the druggist, told me that you were a cow doctor. Are you?" After I explain to the prospective client that I am not just a cow or horse doctor, but a doctor of all domestic animals, I get the history of the case.

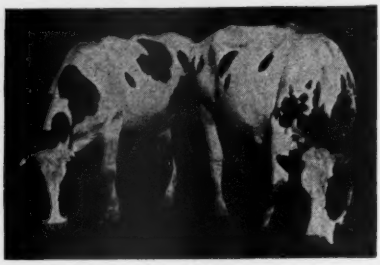
This history often indicates an ordinary case of acetonemia. If acetonemia cannot be eliminated from the diagnosis, a specimen of urine is collected. If this is positive to the ketone test, 500cc of 40% dextrose and one ounce of chloral hydrate are administered. While working I endeavor to find out just how much turpentine has been given per ear or per navel, and sometimes it is necessary to remove a six month's supply of tobacco from the rectum. I leave some chloral hydrate solution to be administered as a drench with a pint of molasses twice a day for two days. A pint of potassium arsenite solution is dispensed as a tonic, and I take my departure with the gentle intimation to the client that with this medicine, and the amount of medication he has given already, nothing more should be needed. This treatment, in grade cattle, has produced 100% satisfactory results for me.

I used to lecture my clients on the evils of turpentine and tobacco as veterinary remedies, but, after a few farmers had patted me on the back and said, "Young fellow, when you get to be as old as I am you will always give an animal turpentine and tobacco when it is needed," then I quit.

My professors in veterinary medicine failed me there; they did not teach me the

indications for turpentine per ear or per navel, nor for tobacco per rectum.

Udall[1] defines acetonemia as "A parturient and nonparturient disease of well-nourished high-producing cows of all ages, characterized by a marked hypoglycemia, acetonuria,



and acetonemia, thought to be due to an impaired carbohydrate metabolism," and quotes Stevens[2] to the effect that " 'Fats burn only in the fires of carbohydrates' (Rosenfeld) and when the latter are deficient the body smokes with unburnt fats—ketones." This is the type most commonly encountered, and it responds well to the usual treatment.

However, I have found a different situation in a large purebred Guernsey herd of over 400 animals (which contains the world's record Guernsey cow in FF, Green Meadow Melba, with 15,242.9 pounds of milk and 963.9 pounds of butterfat), in which the usual treatment for acetonemia cures some animals and kills others. Since I have been in charge of the health of this herd, two cows have died with symptoms similar to those of the nervous type of acetonemia. Both had calved a short time previously. They came into the barn nervously, refused to eat, and did not ruminate. The ketone test for acetonemia was positive. Each was given 500cc of a commercial preparation of calcium and dextrose, and an ounce of chloral hydrate every eight hours. Ten or twelve hours later 500cc of a 40% dextrose solution was administered. Shortly after the administration of the calcium and dextrose solution the cows went down and were unable to get to their feet. A post-mortem examination was performed on both animals about 24 hours after the onset of the disease. Fatty kidneys and livers and flabby hearts were found in each carcass.

In a letter to Dr. Frank Breed, Lincoln, Nebraska, I asked what more could be done than administering the old reliable remedy, dextrose and chloral hydrate. Doctor Breed suggested insulin. In the next two cases of what appeared to be acute acetonemia of the nervous type, I had a blood sugar determination made by the technician at the local hospital. The blood sugar was 99 and 100mg, respectively, per 100cc of blood. Dukes gives the normal blood sugar level of cattle as 40 to 60mg per 100cc of blood.

These two cows were each given 120 units of insulin in 500cc of 40% dextrose, and physiological saline solution q. s. 1000cc, administered subcutaneously in several different sites. No other treatment was given. Each animal made an uneventful recovery, and in three to five days both were negative to the ketone test.

The cows in this purebred herd have a balanced ration and are fed in accordance with a program recommended by a prominent southern agricultural college. They receive molasses on their feed. In my opinion, they are not, as a rule, affected with the condition known as acetonemia, even though they are positive to the accepted ketone test. The condition which I formerly diagnosed as the nervous type of acetonemia now appears to me to be a diabetic one; the carbohydrates which are needed to burn the fats are present, but for some reason are not available for the fire.

In the same herd I have treated several cows with the digestive type of acetonemia. Prompt recovery followed the administration of 250cc of a calcium and dextrose solution.

Since winter has set in, the number of cases of acetonemia has diminished. With the return of warm weather, I intend to carry, as standard equipment, the glassware necessary to collect blood samples for the sugar determination. After 50 or more cases have been studied, examined, and treated with insulin, a more definite report of this condition can be made.

E. E. CHAMBERS

Trion, Ga.

[1] Udall, H. D., 1939. *The Practice of Veterinary Medicine*, p. 312.
[2] Stevens, 1928. *The Practice of Medicine*, p. 797.

A Rabies Enigma

Although rabies has been with us for centuries, there are still unanswered questions about it. Until recently the healthy carrier and the atypical cases carrying the disease have not been generally recognized. The following case, presented at the small animal hospital of Dr. C. W. Bower, Topeka, Kans., demonstrates the possibility that the virus may remain in the body for several months before producing the disease.

On the afternoon of Friday, January 2, 1942, a mongrel terrier was brought to the hospital with a history of vomiting and slight nervousness which the owner had first

Scotch collie showing typical symptoms of dumb rabies. It died seven days later. After symptoms develop dogs usually die in from two days to four days but rare cases have lived weeks

noticed the day before. The dog was the pet of a woman who lived in the business district of Topeka, and the dog was allowed out only for a few minutes of exercise each day. There was no evidence of any wounds, nor had the owner observed any recently. The only noticeable symptom was a slight nervousness; the eyes appeared normal, there was no paralysis of throat or jaw, and the slightly elevated temperature could be attributed to the increased excitability. The owner was advised to leave the animal a day or two for observation; but she wanted to take it home, and since there were no definite indications of rabies, she was allowed to do so, with instructions to bring it back if it became worse.

That evening the dog was returned with a bark that was somewhat characteristic of rabies and was placed in a cage for observation. On Saturday the animal was quite nervous, trying to chew up the cage, and had the characteristic howling bark of a rabid dog. On Sunday it was hoarse and unable to eat, and the lower jaw began to hang down with saliva running from the mouth. The eyes still appeared normal, without the staring expression of most rabid animals. The dog died Monday afternoon, and the head was sent to a laboratory. Negri bodies were found in the brain.

Within the past few years there have been several experiments which have shown that rabies, like many other diseases, can present atypical cases. The Rockefeller Institute Laboratory has injected large numbers of mice with rabies virus. Occasionally one remains well or survives with paralysis, tremor or general malaise. When killed several months later, its brain may harbor the rabies virus and show characteristic lesions of the disease.

The dog that was brought into Doctor Bower's hospital presents a mystery as to when and how long it had been infected. This was the first case of rabies to be reported in Topeka for over three years. The animal's close confinement could be checked back for a period of six months. Although no positive statement can be made, the case appears to point to the possibility that the virus may lie dormant for several months.

ROGER WEST, K. S. C. '42.

Manhattan, Kans.

Vitamin A Deficiency in Feed Lot Cattle

October 25, 1941, while home visiting my father, Dr. P. L. Cady, of Arlington, Nebraska, I was privileged to observe the following case:

History.—A group of 89 white-face steers had been in the feed lot for 14 months and had made an average gain of over two pounds a day. These cattle weighed about 1,300 pounds each and were in good flesh. For the last week or so the owner had noticed that a few had stopped eating and that this number was gradually increasing The feed had not been changed, nor had the ration been altered to any extent.

Upon careful examination of these cattle the following symptoms were observed: The steers that refused to eat showed definite scouring, a loss of the hair luster of the coat and inelasticity of the skin itself. Some of the cattle presented a typical picture of founder in their stiff, rigid, ambling, unnatural gait. The forelegs were edematous, being swollen to about one and a half times the normal diameter. There was a definite loss of weight and finish which had evidently been coming on for at least one week or ten days. Some of the other cattle showed nasal discharge along with drooling from the mouth.

Typical night blindness, a characteristic symptom of vitamin A deficiency, was manifested in eleven of the steers. Three showed complete blindness, with opacity of the lens and ulceration of the cornea. The majority of the affected cattle showed some opacity of the lens along with some epiphora. A diagnosis of vitamin A deficiency was made.

Altogether 24 steers were showing outstanding symptoms. We separated these into another lot and the next morning came back and treated them. One quart of cod-liver oil and a half-gallon of mineral oil were administered *via* stomach tube. The diet was changed from old sealed corn to the new crop of yellow corn and from bleached brown alfalfa hay to some late cutting green hay.

In three days the cattle started to eat and show signs of recovery, and their hair coat began to improve. The eye conditions cleared up in all except the three with ulceration of the cornea, which were sold. In 10 days the rest of the cattle were back on full feed, all symptoms having disappeared.

According to C. C. Hastings, Williamsville, Illinois, yellow corn and alfalfa hay lose about 60% of their carotene content during the first seven months of storage. This may explain the reason for vitamin A deficiency in cattle on full feed in dry lot.

JACK CADY, K. S. C. '42.
Arlington, Nebr.

★ ★ ★ ★

★ ★ ★ Buy Defense Stamps and Bonds

Hints from a Practical Practitioner

Do you pay cash for your supplies and receive the discount? By doing this, you will receive free every 10 years, just twelve months of requirements.

★ ★ ★ ★

As a rule, it is always good practice to render a guarded prognosis. Then, if the patient dies, the client is not so dissatisfied. On the other hand if it gets up and walks off in a few hours, you are not discredited.

★ ★ ★ ★

Due to the present much higher cost of fluid extracts and other alcoholic preparations, why not use more drugs in powder form? By mixing these with syrup, honey or molasses, they can be given as electuaries —not bad at all.

★ ★ ★ ★

In summer, during the hot weather, we keep small vials filled with cotton and saturated with water among our gelatine capsules. This keeps the latter moist, and prevents them from cracking. We keep the ones not needed for use in the cellar.

★ ★ ★ ★

When called to see a patient, always do something, even if there is not the slightest chance of recovery. One can tell the owner: "Well, I'll give the poor animal something that will relieve its suffering." He will feel that he received something for the call—that incidentally makes collections easier.

★ ★ ★ ★

Give intravenous injections very slowly and carefully. Unfortunate results may follow even the best of technic. Of course, this is not so noticeable in milk fever, where the patient is apparently moribund, but giving Lang's solution to horses, and the like, is something else again. When one gains a reputation as a "kill or cure" doctor, he might as well move to another location. Clients lose confidence, and will take a chance on "home treatment" before calling him.

E. T. BAKER
Moscow, Idaho.

Autobiography of a Veterinary Practitioner

By E. T. BAKER, Moscow, Idaho

IV.

College Days

ABOUT the middle of September, 1906, I landed in Columbus, Ohio, from Fort Worth, Texas, several days before the opening of the university. I stayed at a downtown hotel, and from this vantage point spent most of the interval viewing the entire city from a street car, as I always liked to know all about the town I was living in.

On registration day, I presented myself early in the morning, in order to avoid the "rush" of confused and frightened freshmen, and later walked over to the veterinary building, where I met Dean White for the first time. He proved as kind and helpful as Doctor Thompson had been.

About noon that day I met a young man looking for a roommate. Without any further preliminaries, we "joined up," and remained inseparable companions throughout the college course. He had worked during the summer for a successful Detroit practitioner and knew what practice was like. He never missed a clinic, and was greatly interested in surgical work, while I cut all the clinics I could. From all appearances, he was destined to be a practitioner, while I was more interested in research and literary work. The curious sequel is that he has never practiced a day in his life, having held official positions so far, while I have been in general practice for over twenty-eight years, and have made over 30,000 professional calls. That only goes to show one cannot tell how far a flea can jump by the color of its eyes.

About 50 bright and shining faces entered our freshman class, but when the smoke of the first semester had cleared away, only about 30 remained. I found the work rather easy, except chemistry. How I ever passed that course is one of the deepest mysteries of my life. Probably my neat penmanship, careful paragraphing and good attendance at all classes and "lab" periods pulled me through.

My experience in the outside world proved valuable, for I had little trouble in carrying my subjects, and had plenty of time for outside leisure and "side lines." I believe if every student will attend every class possible, and listen carefully to the instructor, instead of dreaming about his best girl or taking a nap during a lecture, he will have little trouble in making the grade. It seems almost criminal to take an inexperienced high school "kid" and shove him into a university, for the bewildered freshman often has only a foggy idea of what it is all about. Perhaps he is utterly unsuited for the course he is trying to master. Sometimes he is there because proud papa went there before him, or the daughter attends because mama wants her to make a sorority. (I am talking from the triple standpoint of student, college professor and parent.)

Perhaps, if our elementary and secondary schools would devote more time to the old fundamentals of spelling, writing, arithmetic, history, grammar and reading, more students would survive the first semester in any college. Then again, more time should be

DAVID S. WHITE

Doctor White, a Colonel during World War I, returned to his duties as dean of the Veterinary Department of Ohio State University in 1919

spent in trying to teach the pupil how to study, and to take an interest in the work, instead of regarding it as a disagreeable chore. I feel now that had I been given more personal attention in the chemistry class instead of being herded into a group of glass benders and pony makers, I might have gained some good from it. The whole difficulty with me was that I did not grasp the fundamentals of the subject, and consequently wandered through the course like a blind person in a fog. My situation might be compared to that of the fussy old lady out at the airdrome. As she was getting in a plane, she said:

"Young man, I want you to be very careful; I have never been in the air before, and this is my first trip."

The young pilot grinned. "Well, you've nothing on me; this is my first trip, too."

During my summer vacation in the freshman year I played professional baseball and saved enough to take a trip out to the Pacific coast just before school began in the fall. I have always been thankful for this trip, because it furnished me with an object-lesson never to be forgotten. Leaving Chicago, bound for Denver as the first stop, an old couple had the berth opposite me. The next morning we went into the dining car together and took the same table, for they were very friendly and agreeable. They nibbled at a little toast and coffee, while I proceeded to put away everything in sight, ranging from fruit, hot cakes, ham and eggs, to three cups of coffee.

"Mother," the old man said to his wife, "we are making this trip just 30 years too late." It was true, for they had spent all their years amassing wealth and neglecting their health. Now, they could not enjoy their money. Here I was, young, energetic, healthy, happy and enjoying every mile of scenery. Youth, indeed, is the time to travel and see things. When the later years creep up on one, it is possible to sit back and review them, much like watching a movie. The old couple and I parted company at Los Angeles. I heard later that they both died that winter. Theirs was the usual experience—they couldn't stand retirement at that age.

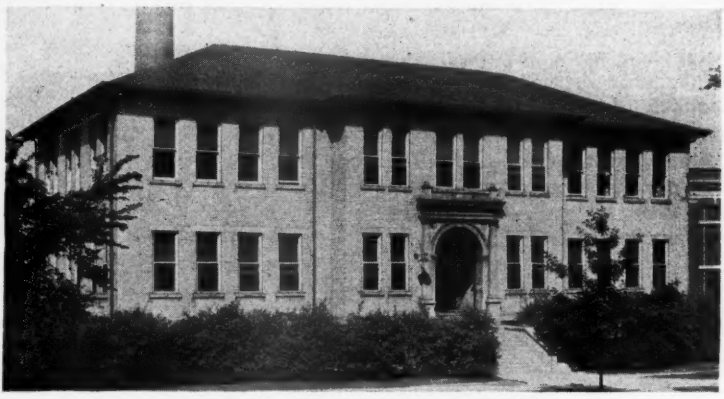
From San Francisco I took the boat for Portland, Oregon, and was quite seasick, but quickly recovered when the ship reached Astoria, at the mouth of the Columbia river.

Veterinary Clinic and Department of Pathology, Ohio State University

Going to Seattle, I came back to Columbus in September by way of Spokane, Minneapolis and Chicago, thus seeing what a large and beautiful country we really have. In those days, a trip like that was enjoyed by very few; millions of people were born, lived and died without ever getting a hundred miles from their homes. In fact, strange as it may seem now, most of the boys and girls I grew up with never got farther from home than Niagara Falls, which was the standard honeymoon trip, and could be taken on an excursion train for the sum of three dollars, round trip, per person. At big family reunions on Christmas, one of these fortunate world wide travelers was always on hand to regale the entire assemblage with stories of "Buffalo, Niagara Falls, Brock's Monument, and the Gorge."

When I came back to Ohio State that September, Dean White was looking for a private secretary. As I was the only student trained in secretarial work, he gave me the job at a monthly salary of $25. I also averaged around $20 a month from Doctor Sisson. It may interest some freshman to know that I typewrote and arranged the index of Sisson's *Anatomy*. I worked two years on this volume, and over six months were spent on the index alone, which contains around ten thousand separate subjects. Being naturally indolent, I was always inventing an easier method to do the work, and thus save my nervous system from mental fatigue. For this, I devised a method of using little cards which proved very helpful.

It would have taken the FBI to have discovered me studying, for I devised a system to avoid this laborious task. Being able to write shorthand, I paid strict attention to the professor's oral spasms, and whenever he stressed anything, or repeated it, I made a special note of it. After the lecture, I typed it quite fully, using red ink for the information he considered vitally important to unborn generations. These notes were so highly regarded by the other students they paid me a dollar and a half for the set.



Veterinary Laboratories, Ohio State University

About an hour or so before a final examination, I hastily refreshed my memory from these notes, and since I was able to write legibly and easily, and to emphasize the very things the instructor considered most important, my grades were always good. In other words, while I did not know any more than the law allowed, and probably a good deal less than the college regulations required, I could place that little in such a way that each word counted. Modern students term this "apple polishing," but it has always been found useful in every branch of making a living. It may also be termed craftmanship, or a desire to do the thing at hand as well as one can. If one is playing first base, one should try to be a good first baseman, instead of attempting to be an all around mediocre player. If one is in meat inspection, the goal is to know all

about that subject. If in practice, one should be able to confront the problems met with in everyday work. A person who realizes his limitations, and knows he cannot be good in everything, will probably prosper. The competition is severe among the jacks-of-all-trades and masters of none.

I owe much to Doctor White for this orderly system, and to Doctor Sisson also. He was the personification of doing one thing well, and never being hurried. It has greatly helped me during the 32 years since I left college, in general practice, teaching, state work, research and writing. I have never cared for riches, nor yearned to be a "big man." I like to retain a certain amount of leisure for my own amusement or recreation, and to have time to write, read or just relax beside the radio. I figure there will be quite a lot of work for the next generation, and, as Bill Nye once said: "Why worry about posterity? What has posterity ever done for us?"

My next summer vacation was spent at Cedar Point on Lake Erie, as private secretary for Dr. Herbert Osborn, the noted entomologist. I had been doing some work for him when he was writing a book, and he asked me to go with him during the vacation. I spent a very enjoyable six weeks working with him, and then went out to Montana for a short visit.

Then came my senior year. One humid day in June, 1909, completely covered with the warmest cap and gown so-called education ever compelled a white person to wear, I received my diploma. This entitled me to go out into the world and make a living or starve to death. However, the future looked bright to me, for I had nearly all of my original five hundred dollars; a trade, a profession; and a job at the Washington State College.

In looking back over my college career, I realize now I was fortunate in having a job handed to me on a platter. The only explanation is that I was trained for the work and could handle it. I suppose this teaches some kind of a lesson, but I don't know what it is. Emerson once wrote something about a mousetrap that may explain a lot.

(To be continued)

An Effective Animal Disease Barrier

The federal Bureau of Animal Industry was organized 58 years ago, and ever since has maintained an inspection and quarantine service to prevent the introduction of destructive animal plagues from foreign countries. In this long period but one serious infectious disease of animals — foot-and-mouth disease—has effected entrance to our flocks and herds. And that one, although it has crashed the barrier repeatedly, has as often been completely eradicated. In the same period, most other countries of the world have experienced devastating epizootics of disease, unknown in this country —epizootics that cost their animal industries hundreds of millions of dollars.

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Be Systematic in Examining Ailing Animals

A pitfall that not infrequently traps the young veterinarian is a lack of thoroughness in examination. He must early learn what is seldom sufficiently impressed upon him as a student; that disease is but seldom the work of a single invader. There is a very old saying that misery loves company. It is a record of human experience and lots of it. We must not forget that Pandora did not release her troubles singly, but all at once. Surely it is in only the minority of cases presented to the veterinarian that the ailment is solely a conflict between a single pathogen and the host. For example more than one capable small animal practitioner has stated, without equivocation, that 75% of the dogs brought to him for treatment are suffering to a greater or lesser degree from malnutrition. If such be the case, it can be seen how very far short one falls of carrying out the dictum of therapeutics if he pick out some single complaint such as gastritis, diarrhea, distemper or even a broken leg or a fractured pelvis, and treats that alone when the animal is suffering, at the same time, from malnutrition that will have an important bearing on the outcome of this battle he is waging with a pathogenic organism or a destructive traumatism or a urinary calculus or whatever it may be.

Abstracts

Efficacy of Entozon in the Infusion Treatment of Mastitis

Stewart[20] treated 40 cows affected with contagious bovine mastitis by udder infusion with a 1:1250 solution of entozon. The cows were kept in two different herds. Approximately 70% of the treated cows in each herd responded to two or three treatments and ceased to harbor *Str. agalactiae*. It is perhaps significant to note that results of the same order were obtained in both herds. [The results obtained by Stewart confirm those obtained by Stableforth and Scorgie in Great Britain.] The majority of the cows which were resistant to treatment showed extensive fibrosis of the udder. A few of the resistant cases, however, did not fall into this category, and Stewart rightly points out that apart from the severely fibrosed cases which may be classed as hopeless there is nothing to differentiate those cows which will respond to treatment and those which will not.

All the cows were treated during the lactation period. Because of the difficulty of detecting all infections at one examination, Stewart found it wiser to treat all four quarters in any cow found to be infected irrespective of the number of quarters in which infection was diagnosed. The average time taken to treat all four quarters of one cow was 20 minutes. Milk samples from the infected cows were submitted to bacteriological examination seven days after treatment. If the examination was negative, further samples were examined after an interval of seven days. All cows found to be still infected at either the first or second examinations were subjected to another treatment. Thus all cows were required to pass two bacteriological examinations at an interval of a week before being considered free from infection.

A point of great interest in respect of one herd to which Stewart draws attention is that of 14 first-calf heifers which had never been in contact with the dairy before the first milk samples were taken, six were found to be infected with *Str. agalactiae*. The latter were not all born from infected dams.

Stewart states that he has not found udder infusion to be of any great assistance in acute cases of staphylococcic mastitis. As might be expected, it is impossible to infuse any quantity of fluid into an acutely inflamed quarter.

[20] Stewart, D. Forsyth, 1940. The efficacy of udder infusion with entozon as a treatment for infection with Group B streptococci (*Str. agalactiae*). *Aust. Vet. Jnl.* 16. pp. 108-111. Abst. by N. J. S. in *Vet. Rec.* 53:52, p. 764.

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Sterility and Vitamin E

Bagé[11] reports therapeutic results obtained in treating female domestic animals for sterility with wheat germ oil. Some ascribe to vitamin E biological properties similar to those of some sexual hormones. Injecting vitamin E intramuscularly or into the peritoneal cavity, Verzar observed in female rats the same biological reactions shown after administration of gonadotrope hormone; i.e., estrus, hypertrophy of the uterus, precocious puberty.

Bagé himself performed many experiments on castrated female rats, on bitches and sows not yet arrived at puberty and on pluripara ewes. In one sow heat appeared a few days after the injection, but it was a normal, physiological estrus. Another sow did not react at all. He injected vitamin E in an ewe; five days later she exhibited physiological estrus. Later on he injected in the same animal a 50% stronger dose for two days. The interestrus remained normal. The author repeated the experiment with much higher doses. The interestrus did not change at all.

In 10 days Bagé injected in two bitches of five months of age and not yet arrived at puberty 1/100gm of wheat germ. There were no signs of estrus, nor did any change in the genital organs appear on the postmortem examination. Neither in castrated female rats did similar injections produce any estrogen change.

Owing to these results, the author believes there is no influence of vitamin E that causes a change in the genital organs of the above mentioned animals.

[11] Bagé, H., 1937. Sterilite et vitamine E. Thesis discussed in Paris, 1937. Abst. in Rec. de Med. Vet. d'Alfort, 116:2 (February, 1940).

Book Reviews

The Furtherance of Medical Research. *By Alan Gregg, M.D.,* Director for the Medical Sciences, Rockefeller Foundation. Cloth bound; 129 pages. Yale University Press, New Haven, Conn., 1941. $2.00.

This volume deals with the problems of research—and the long, hard road it had to travel before it gained public recognition and support.

It is divided into three parts; first is a description of medical research, followed by a discussion of research in universities and foundations—then comes the medical research worker.

The book deals with many varied phases of the problems, misunderstandings and the subsequent far reaching results of research, too exhaustive to lend themselves for review; therefore we give a few pertinent quotations:

Medical research as a deliberate, well-supported activity of man is new.

Industry as a contributor to medical research becomes increasingly important.

Medical research calls for men possessing that rare talisman, a discovering mind.

Scientific research attains, in its successful moments, a constantly closer approximation to the truth.

There is also veterinary medicine—a fact which suggests that medical research is biological research.

We see research in medicine carried on under a variety of auspices today. Chief among them are the universities and the independent institutions.

Research in any field as a procedure consists of a sequence of activities each of which contributes to, but cannot be substituted for, the whole process.

The perpetual enemies of the human race apart from man's own nature are ignorance and disease. It is for the purpose of fighting disease and ignorance that medical research and medical education exist.

Research discovers substances, facts, relationships. Or it often illuminates more fully or more precisely interrelationships already known.

The last hundred years have witnessed light cast upon nearly every recognized disease as a result of deliberate research efforts.

Most of the knowledge and much of the genius of the research worker lie behind his selection of what is worth observing. It is a crucial choice, often determining the success or failure of months of work.

Many colleges and universities that are now important centers of research made little provision for it twenty-five years ago. They were glad to say that their professors were conducting original work, since this was good advertising.

Dr. Gregg candidly discusses some of the shortcomings of the foundations and their methods, the obstacles to their and the universities' doing their job properly, the booby traps and temptations that lie in their way. But here at first hand is an account of the men of good will, with none of the sanctimoniousness that has often characterized philanthropic endeavors, of men who critically, earnestly, doggedly, and intelligently have labored in the heat of the day and from whose minds will come the advances of the future.—*G. H. C.*

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Useful Bulletins

Raising Calves When Milk Is Scarce. Cir. 326, College of Agriculture, The University of Wisconsin, Madison.

A Herd Program of Mastitis Prevention and Control. Unnumbered circular, College of Agriculture, University of Illinois, Champaign.

The Trench Silo pays big returns says Ivan D. Wood of the University of Nebraska in this illustrated booklet, 28 pages, issued by John Deere, Moline, Ill. Includes diagram showing how to build one.

Produce Pork at a Profit—there's a quick turnover in pigs and this seems like a good time to look into it; write the Quaker Oats Company, Chicago, Ill.

Pasture—A Paying Crop—Another of the series of useful booklets written by college teachers, this time R. F. Fuelleman and W. L. Burlison of the University of Illinois, for the energetic John Deere outfit of Moline, Ill.

You may obtain any book reviewed in this department by remitting the published price to the Book Department of VETERINARY MEDICINE, 7632 S. Crandon Ave., Chicago, Ill.